THE INDUSTRY'S RECOGNIZED AUTHORITY

ROCK PRODUCTS

LARGEST PRODUCER CIRCULATION IN THE HISTORY OF THE FIELD

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South Africa's First Phosphate Plant page 84
Hydraulic Transport of Solid Materials In Pipe page 114

Aerial view of Construction Aggregates Corp. sand and gravel plant at Ferrysburg, Mich.

DECEMBER 1955

NEW Mack B-80 SERIES—

a money-making giant for heavy quarry work

New features make this rugged six-wheeler more powerful, sturdier . . . and a greater work producer than even its great Mack predecessors!

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FULL RANGE. 11 models to choose from, giving you a complete selection of sizes and capacities to meet your own needs exactly.

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3471

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RESEARCH KEEPS **B.F.Goodrich** FIRST IN RUBBER

Picking up oyster shells with a vacuum cleaner

A typical example of B. F. Goodrich improvement in rubber

BENEATH that water, there's a vast deposit of oyster shells—wonderful for poultry when crushed. The shells are sucked out of the riverbed and into the dredge through the long metal pipe hanging from the boom. Only one trouble.

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The dredge operator tried B. F. Goodrich sand suction hose, and found that where other makes sometimes wore out in weeks, hose made by B. F. Goodrich lasted 8 to 10 months on the average. One in particular handled over 3 million yards of abrasive shell and sand before it was replaced.

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ROCK PRODUCTS

THE INDUSTRY'S RECOGNIZED AUTHORITY — LARGEST PRODUCER CIRCULATION IN THE HISTORY OF THE FIELD

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B-1070

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"HERE, AT THE CRUSHER, is where you see how EASTON pays off! It's the only equipment specially built for this work —steady shuttle service between shovels and crushers. Savings you make *right here* with EASTON pile up all day.

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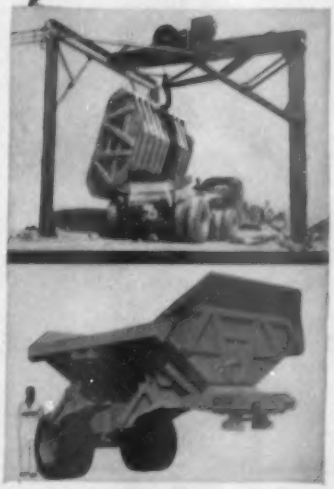

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An Allis-Chalmers rod mill converts stock piles of unsalable material into *specification* sand. It prolongs the productivity of natural reserves. It produces specification sand in areas where natural sands are unusable, thus eliminating transportation expense and inconvenience.

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Produces Cubical Product — Rod mill action breaks long, flat particles and knocks rough corners off other particles. This results in a desired cubical product . . . a product that has a definite effect on concrete strength and the amount of cement required.

Affords Specification Flexibility — You can meet varying specifications with an Allis-Chalmers rod mill by changing the rod charge, feed and feed water. Once mill is adjusted to produce a required product, it needs very little attention.

For complete information on Allis-Chalmers rod mills, see your A-C representative or write Allis-Chalmers, Milwaukee 1, Wisconsin, for Bulletin 07B6718A.

A-4658

ALLIS-CHALMERS

Another quarry that can tell you about ROCK SHOVELS!

● The Mausdale Quarry of Danville, Pa., puts their machines in material that will really test equipmen:. Look at the samples in the picture. It is service in stuff like this that has made the Mausdale Quarry buy their 6th Northwest.

Northwests are *real* Rock Shovels! Get up on a Northwest sometime if you know operation. Get the feel of the controls yourself. Feel that crowd take a-hold. The dipper goes right on through as the hoist takes it up—no "re-starts" are required here. It's a full load in one cut. Remember the Northwest Dual Independent Crowd utilizes force most other independent crowd shovels waste—force that puts greater effectiveness at the dipper lip for handling tougher digging and producing more output.

To Northwest digging power add the "Feather-Touch" Clutch Control which brings ease of operation without the complications of pumps, piping and compressors; the Cushion Clutch that eliminates shovel overloads before the damage is done; Uniform Pressure Swing Clutches that cut spotting time by eliminating the jerks and grabs in swinging; Northwest simplicity of design that makes upkeep easy and reduces "down time"; and all other Northwest advantages that make Northwest a *real* Rock Shovel.

You can plan to have a Northwest. Now is the time to find out about Northwest design and operation. Why not talk it over with a Northwest Man?

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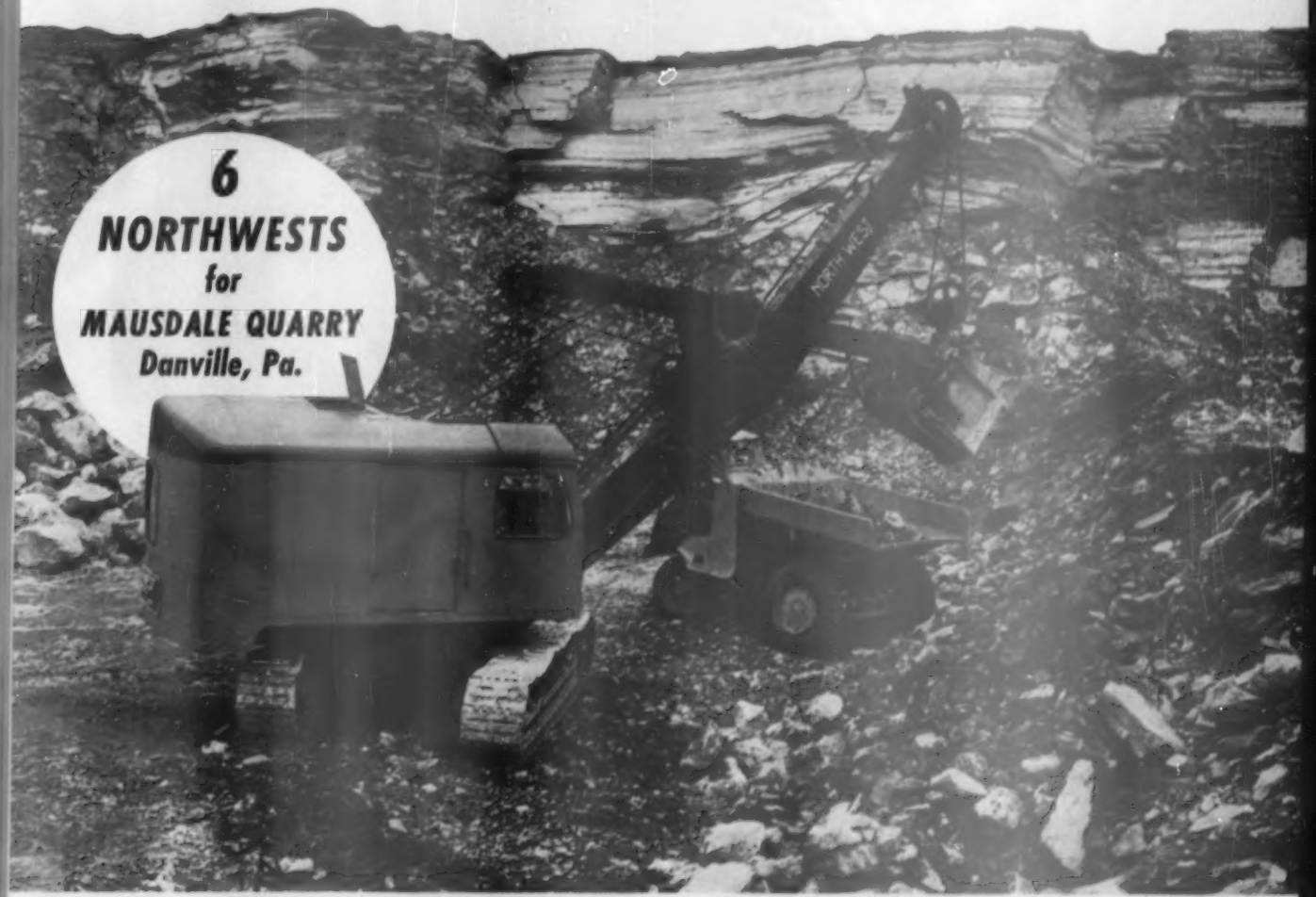

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Behind every Eaton Axle there is almost a half-century of truck axle manufacturing experience. The advanced engineering and quality construction which have made Eaton 2-Speeds famous for stamina and low-cost hauling are also found in Eaton single-reduction, double-reduction, tandem drive axles, and front axles. In more than two million motor trucks, Eaton experience and engineering know-how are reflected in outstanding performance records, minimum hauling costs, and longer vehicle life.

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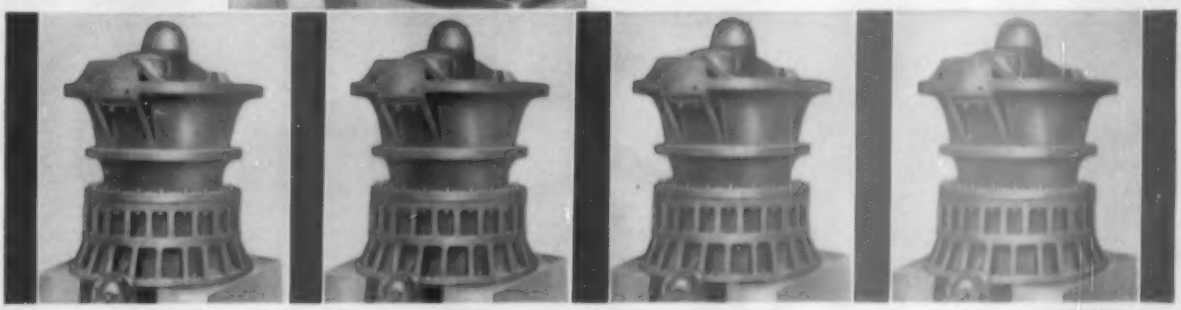
Aurora Taconite Project uses Traylor's Experience to get Economical Production of Taconite Ore

Traylor Now Building Giant Primary Crusher

WITH 60" RECEIVING OPENING AND 120" DIAMETER CRUSHING ROAD



. . . plus four 36 Gyratories for Aurora Taconite Project

Profitable production of iron ore from low-grade Taconite calls for the most modern, efficient methods and equipment. That's why Traylor Gyratories were selected for both primary and secondary reduction of the extremely hard Taconite-bearing rock.

Traylor is now building a huge 60" Gyratory Primary Crusher which is higher than a three-story house and weighs more than a million and a quarter pounds . . . this giant TC Gyratory is the seventh of its kind to be built by Traylor. Chunks of ore the size of a flat-top desk dumped into this crusher at the rate of 4,000 long tons per hour will be reduced to 12". In a 15 hour day, this TC will crush 66,000 long tons of rock.

Four 36" Traylor Gyratories will take the 12" ore from the crusher and reduce it to minus 5" in the secondary reduction operation.

For the past 50 years, leaders in the mining industry throughout the world have turned to Traylor for the most efficient equipment to help them keep pace with advanced mining methods.

* * *

For complete specifications and description of the outstanding features of Traylor TC Gyratory Crushers, send for your copy of Traylor Bulletin No. 126.

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Check

PRICE PER POUND OF LIFT CAPACITY

Here is a sound way to measure the value of excavators and cranes. Compare machines on the basis of price per pound of lifting capacity. You'll very quickly learn which machine offers you the biggest production capacity per dollar of equipment investment.

Remember — lift capacity is *work capacity*. Obviously, the machine with heaviest lift rating not only picks up larger crane loads. It also has more strength, speed and stability with every excavator attachment to handle bigger loads on a faster operating cycle.

Check the Koehring lift ratings shown below — then ask your Koehring distributor to give you the figures on price per pound of lift capacity.

compare for yourself:

KOEHRING MODEL	SIZE DIPPER	KOEHRING LIFT CAPACITIES (Crawler ratings based on 75% of tipping load. Rubber-tired machines — 85% of tipping load)		PRICE PER POUND OF LIFT CAP.*
305 CRAWLER	½-Yd.	20,000 lbs.	30-foot boom at 10-ft. radius	?
205 ON RUBBER	½-Yd.	30,000 lbs.	25-foot boom at 12-ft. radius	?
304 CRAWLER	¾-Yd.	27,800 lbs.	35-foot boom at 12-ft. radius	?
304 ON RUBBER	¾-Yd.	30,000 lbs.	30-foot boom at 10-ft. radius	?
405 CRAWLER	1-Yd.	40,000 lbs.	40-foot boom at 12-ft. radius	?
605 CRAWLER	1½-Yds.	72,300 lbs.	50-foot boom at 12-ft. radius	?
1005 CRAWLER	2½-Yds.	139,000 lbs.	50-foot boom at 12-ft. radius	?

Figures available on request—ask your Koehring distributor to see them.

KOEHRING COMPANY Milwaukee 16, Wis.
Subsidiaries: JOHNSON
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Installed cost

reduced 25% by

prestressing with Type PS

American Strand

● The prestressed members of this concrete bridge in Pennsylvania cost about 25% less, installed, than conventional built-in-place members of equivalent strength. These beams were pretensioned with Type PS American Strand to give them extra strength and durability at lower cost.

Maybe you don't use strand in your prestressed concrete. You may prefer a method that utilizes wire instead of strand. You may prefer post-tensioning to pretensioning. You may prefer site-casting to factory fabrication. Whatever type of prestressing you decide upon, you can get an American *Super-Tens* Wire or Type PS American Strand that suits your job. These products have been thoroughly tested and proved *in service* on hundreds of prestressed concrete structures.

On these many jobs, our engineers have learned a great deal about all types of prestressing. They'll be glad to help you on your next job. Just send the coupon.

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Cleveland 13, Ohio

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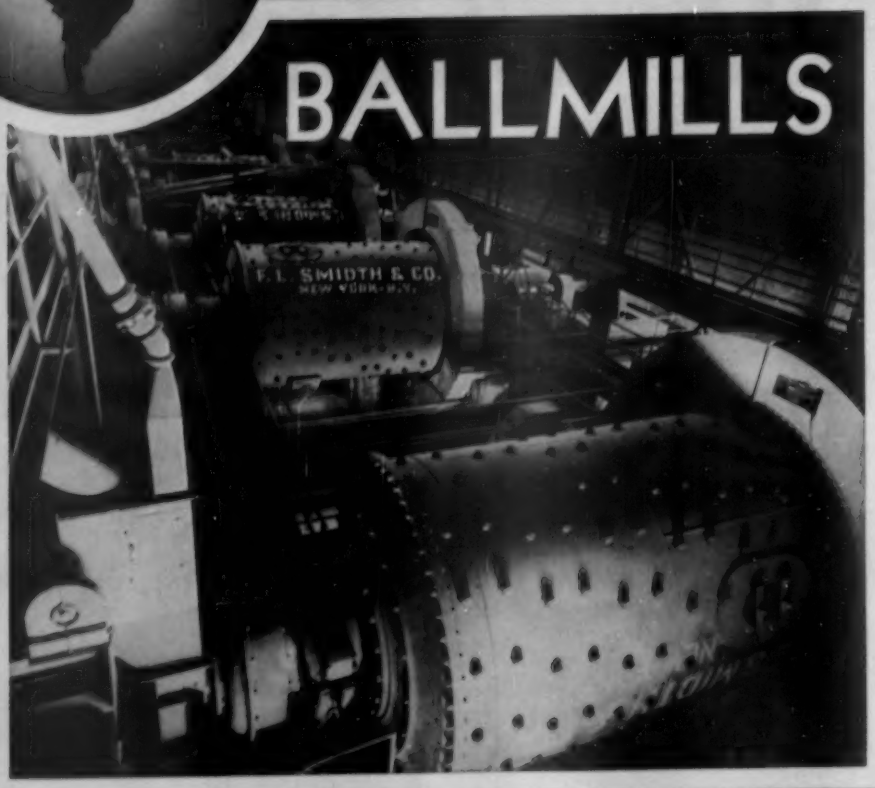

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What's Happening

IN OTHER FIELDS OF INTEREST TO THE ROCK PRODUCTS INDUSTRY

December, 1955

Three electronic scales have been installed by the Minnesota Highway Department, to check weights and determine overloads of trucks entering Minneapolis and St. Paul on three major highways. The detectors, designed to enforce truck axle load limits, measure the weight on each axle, as the truck wheels pass over a platform, and records it on a tape in the scale house. If the truck is overweight, an electric sign 600 ft. beyond the detector lights up and instructs the driver to "go to scale." Only overloaded trucks are stopped, eliminating congestion at scale houses. Overweight trucks are weighed again and subjected to a fine.

The Atomic Energy Commission is soliciting proposals for the production of refined uranium salts in privately owned and operated plants, in an effort to enlarge the scope of private participation in the uranium industry. Specifically, the Commission is interested in firms which would process, over a five-year period, uranium ores or concentrates to either uranium tetrafluoride, or uranium hexafluoride, with deliveries to begin about July, 1958. The Commission will consider proposals, through March 31, 1956, for production rates up to a maximum of 5000 tons U_3O_8 equivalent annually.

A three-mile conveyor system, consisting of 14 conveyors, each 800 to 1500 ft. long and linked together, will be used for continuous movement of sand and gravel to Aluminum Co. of Canada's plant site at Kitimat, B. C. The sand and gravel will be used as "fill" to raise the site approximately 20 ft., and to provide proper soil conditions for an addition to the plant.

Colored asphalt, obtained as a leftover from the extraction of aluminum from bauxite rock, is being tested for possible use on Italian highways. The colored asphalt may find use in reducing highway glare, as well as acting as a color indicator for directions. For example: follow the red road to Rome and the beige road to Naples. Variations of red, green, white, brown or yellow may be produced.

The trend toward continuous processing and more automatic means of production is increasing the demand for direct-current drives, according to P. D. Ross, manager of marketing, General Electric Co.'s Direct Current Motor & Generator Dept.

West Germany will supply $5,000,000 worth of cement, iron and steel for construction of United States military bases in Spain, according to the economics ministry at Bonn, Germany.

Heavy construction awards, nationally, totaled $16,053,685,000 for the first 44 weeks of 1955, 34 percent above 1954, and 17 percent higher than the previous record set in 1952, as reported in Engineering News-Record.

Synthetic mica is being produced at a plant in Caldwell Township, N. J., built by Synthetic Mica, a wholly owned subsidiary of Mycalex. The plant, said to be the first of its type in the world, is expected to produce 1000 tons annually. The synthetic product is claimed to be superior to natural mica for certain applications, but is not suitable for electronic tubes, etc., where large crystals are required.

Construction contract awards, in the 37 states east of the Rockies, totaled $18,165,044,000 for the first nine months of 1955, according to an **F. W. Dodge** report. This was a 25 percent increase over the same period in 1954, and came close to the record-breaking total of $19,770,207,000 for all of 1954. Nonresidential building contracts for the first nine months of 1955 were $6,415,408,000, up 22 percent; residential contracts were $7,965,550,000, up 29 percent; and utilities and public works totaled $3,784,086,000, up 25 percent.

Federal-aid to the states for highways for the fiscal year of 1957 has been set at $875 million. The apportionment, which was announced five months before the time limit set by Congress, provides for $315,000,000 for primary systems, $210,000,000 for the secondary system, $175,000,000 for urban extensions, and $175,000,000 for the interstate system.

Natural gas is dehydrated to about 7 lb. of water per million cu. ft. by means of a coarse granular, pre-attrited silica gel which has undergone more than a year of field testing at United Gas Pipe Line's plant at Carthage, Texas. The dehydrated gas prevents hydrate formation which clogs lines, decreases corrosion, and reduces power costs for compression.

About 50,000 tons of limestone, slag and cinders treated with calcium chloride have been used to combat icy pavements on the Ohio Turnpike. Silica sand has also been used to keep bridge roadways free from ice, and about 40,000 ft. of snow fence has been purchased to prevent snow from drifting.

The number of railroad cars loaded with revenue freight by American railroads is expected to increase 9.4 percent in the fourth quarter of 1955 compared with the same period in 1954. The estimate was made by 13 Regional Shippers Advisory Boards, composed of 26,000 freight shippers and receivers and those interested in transportation throughout the United States.

Sample concrete block treated with silicones are said to resist deterioration twice as long as untreated samples under freezing and thawing conditions. Silicone treatments may find use in lengthening the life of concrete highways, bridges and pavements.

About 250 gal. of gasoline were recently stolen from the Gurlea Sand and Gravel Co., north of Salem, Ohio. The thieves left no trace, despite the fact that several cars or a truck would have been necessary to haul that much fuel away.

THE EDITORS

'56 Ford valve advancements for extra-long truck engine life!

Sodium-cooled valves that operate up to 225° cooler among the many new durability features

Every 1956 Ford Heavy Duty Y-8 engine brings you a *combination* of long-life features available in no other trucks.

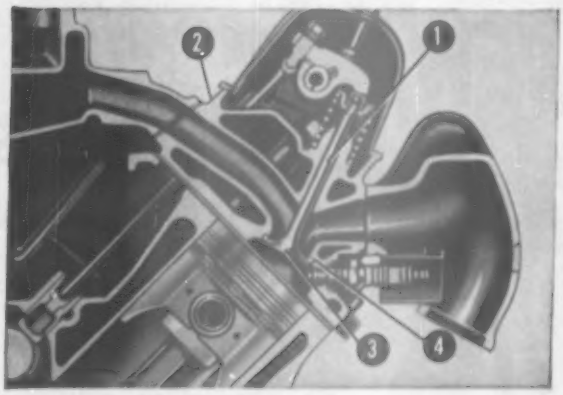
The long life of these new engines (offered in all Series 600 and larger trucks) begins right with the basic engine structure—the block.

Compared with ordinary V-8's, Ford's *Y-8* engines have a deeper, more rigid block. This extra depth holds main bearings in more precise alignment and gives the crankshaft better support.

Stress-relieved cylinder heads are specially heat treated to resist warping. As a result, the heads remain "true" and valves retain their precise fit. Also, there's less chance of compression leaks around the heads. Gaskets stay on the job much longer—reducing truck down-time.

Sodium-cooled exhaust valves play a major part in slashing upkeep costs. Instead of having solid stems as ordinary valves do, the stems are hollow and partially filled with powdered sodium. Under heat, the sodium *turns into a liquid*. This liquid carries heat *away* from the valve heads far faster than solid stems do. Valves run up to 225° cooler, *last far longer*.

But even the best valve won't do its job right unless it closes against an equally durable seat. That's why Ford sodium-cooled exhaust valves have superhard alloy seat inserts.



1—Sodium-cooled exhaust valve **2**—Stress-relieved cylinder head **3**—Tungsten-cobalt alloy valve facing **4**—Tungsten-cobalt alloy seat insert.

Solid tungsten-cobalt alloy seat inserts. These special inserts are highly resistant to heat and wear. And, for still greater mileage before valve regrinding, exhaust valve heads also are faced with tungsten-cobalt alloy.

Other Ford Heavy Duty features include self-sealing, dish-shaped intake valves that seat tightly under extreme heat conditions . . . full-flow oil filter to clean *all* the oil and cut engine wear . . . and special long-life copper-lead bearings.

These and still other Ford features help keep engine efficiency at its peak for many more miles. They extend engine life and cut maintenance costs. All told, it's a combination you can get *only* from your Ford Dealer. Be sure and see him before you buy your next truck.

New Ford Big Job—the '56 F-800. Choice of two Heavy Duty engines: new 190-h.p. Y-8 . . . or new 200-h.p. Special Y-8 with exclusive hood airscoop, 4-barrel carburetion and dual exhausts. New tubeless tires, tachometer and new 18,000-lb. rear axle are *standard*. Big new 24,000-lb. GVW rating; GCW, 48,000 lbs.

NEW BIG SCALE PERFORMANCE

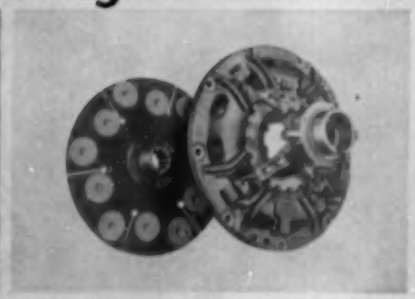
NEW OPERATING EASE AND COMFORT

ALLIS-CHALMERS BIG NEW

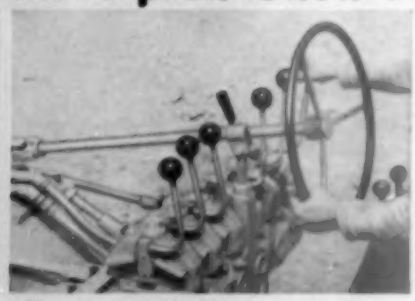
*ROLL-AWAY is an Allis-Chalmers trademark.

Major advantages that mean more production . . .

Powerful new Allis-Chalmers diesel featuring exclusive "follow-through" combustion for smooth performance, clean combustion, extra-long life.



Exclusive new ceramic clutch lining sets new standards of long clutch life, keeps clutch operating longer between adjustments, reduces lever pull.



All-new toggle-type controls give a *Forty Five* operator precision control with positive "feel" — in addition to easy finger-tip action regardless of load.

Forty Five MOTOR GRADER

120 HORSEPOWER • 23,800 POUNDS

The *Forty Five* is a truly modern heavy-duty motor grader . . . designed for progress and built to *today's* standards of accuracy, dependability, operating ease and low cost. On road construction or maintenance work, you'll see all the advantages of balanced power, weight, traction and proper speeds . . . plus brand new advantages for the operator and mechanic that no other heavy-duty grader offers.

We invite you to check the features shown here. Then for the full story on the *Forty Five* — including extra-big clearances, exclusive ROLL-AWAY* moldboard, single-member tubular frame and fully enclosed power steering —see your nearby Allis-Chalmers dealer.

CONSTRUCTION MACHINERY DIVISION, MILWAUKEE 1, WISCONSIN

ALLIS-CHALMERS

. . . less maintenance . . . easier and better operation!

New accelerator-decelerator pedal lets the operator increase or decrease engine speed with his foot — without changing his hand throttle setting.

"Box seat" comfort and visibility. Foam-rubber seat adjusts for sit-down or stand-up operation. Flat, roomy platform has tapered corners for top blade visibility.

Matchless servicing accessibility. Unit construction permits easy service or removal of clutch, transmission or engine without disturbing adjacent parts.

Electrode Breakage is no problem in Buell "SF" Electric Precipitators

Buell Cyclones offer two "extra-efficiency" advantages: (1) exclusive shave-off which harnesses double-eddy and puts it to work, and (2), large diameter design which eliminates clogging.

Besides eliminating efficiency drops and "shutdowns" due to electrode breakage, Buell's unique Spiralectrode permits higher and more constant emission, extra efficiency. Also, Continuous Cycle Rapping—another Buell exclusive—keeps electrodes constantly clean for maximum performance!

Buell's Low Resistance Fly Ash Collector combines top efficiency with low draft loss, for natural or forced draft installations. Ideal for boilers from 100 to 2000 BHP.

For more specific data about Buell's *extra efficiency*, write Dept 17L, Buell Engineering Company, 70 Pine Street, New York 5, N. Y.

buell

MECHANICAL ELECTRICAL

Experts at delivering Extra Efficiency in **DUST COLLECTION SYSTEMS**

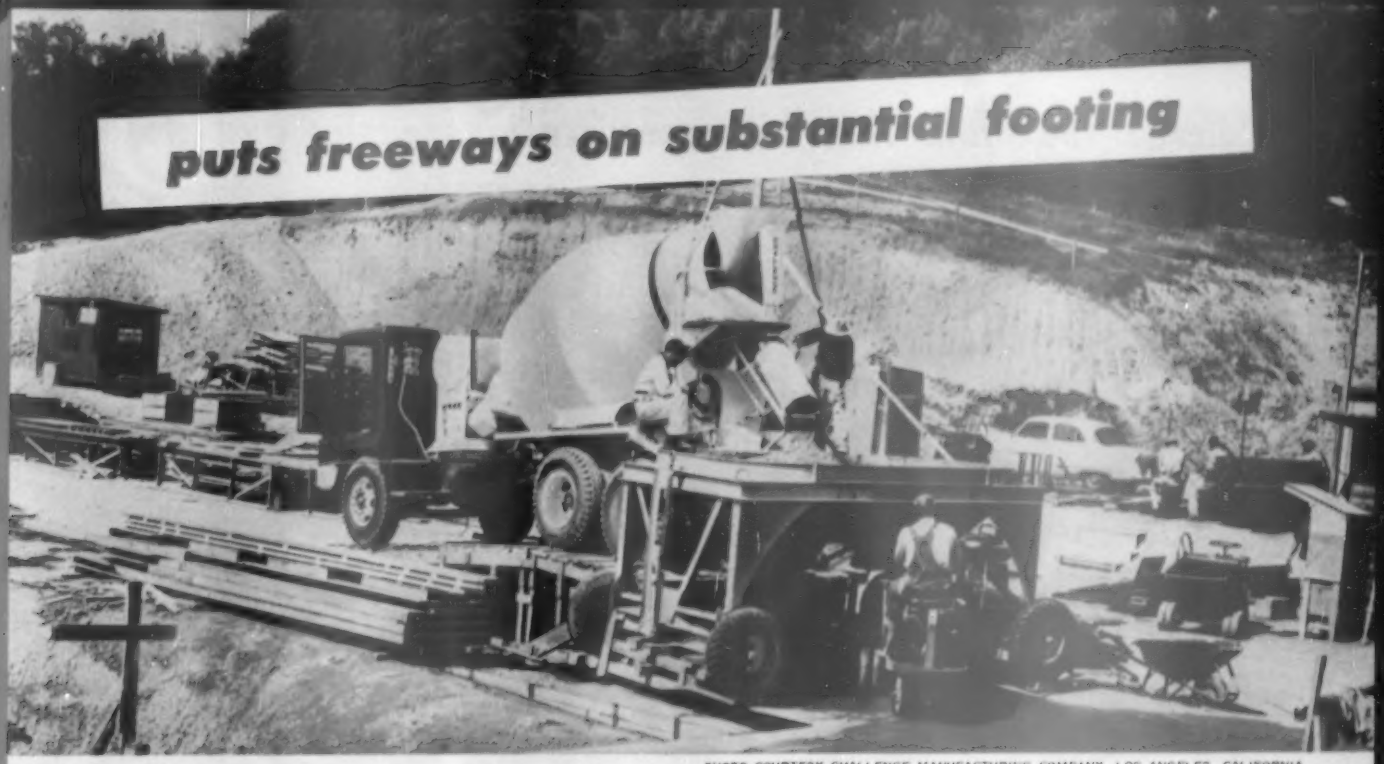


PHOTO COURTESY CHALLENGE MANUFACTURING COMPANY, LOS ANGELES, CALIFORNIA

Chrysler Compact Power and drive package ideal for sidemounting on transit mixer

Working hard to keep pace with its growing population, the State of California is underway with a substantial highway program. Great limited-access arteries are already carrying millions of vehicles past populous points and more "freeways" are in the making.

Here pictured in construction is an overpass on one section of the Southern California Freeway. A Challenge Transit Mix Pacemaker is pouring concrete into a collecting hopper. The hopper in turn will empty the mix into a power buggy which will carry it to the forms.

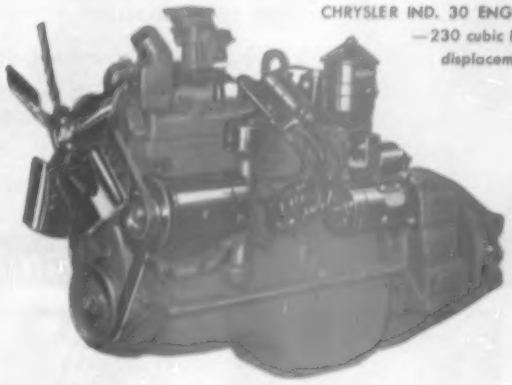
Probably neither the operator nor the contractor has given the ramp the truck is backed up onto a second thought —nor should they. Twelve-degree inclines are not unusual for modern-day transit mixers. Mixer manufacturers build and power their units to give maximum performance under every conceivable condition. That's why Challenge Manufacturing Company powers the bulk of its highly-regarded transit mixers with Chrysler Industrial Engines. Then too because of their light weight, compact construction, Chrysler Industrial Engines are "made to order" for Challenge sidemount construction. Engine, drive and transmission are on the side of the truck bed alongside the drum.

The 6½ cubic yard capacity mixer pictured uses the 230 cubic inch displacement Chrysler Ind. 30 Engine equipped with Chrysler gyrol Fluid Coupling. This "package" is a standard feature of Challenge Mixers. The result is a power-packed combination with built-in protection against the wear and tear of daily use and possible inexpert operation.

Important manufacturers of construction equipment have found it good business to offer their customers dependable equipment, dependably powered. For most of them that means Chrysler Industrial Power. They have found, as you will too, that Chrysler production-line methods adapted to specialized industrial engine building provide custom-built engines at mass-production prices.

See a Chrysler Industrial Engine Dealer or write:

Dept. 1412, Industrial Engine Division, Chrysler Corp., Trenton, Mich.



CHRYSLER IND. 30 ENGINE —230 cubic inch displacement

CHRYSLER *Industrial Engines*

INDUSTRIAL ENGINE DIVISION • CHRYSLER CORPORATION

HORSEPOWER WITH A PEDIGREE

AGRICULTURE INDUSTRY CONSTRUCTION OIL FIELDS

"Here's the plant that hits specifications easier and closer than any other plant we've ever operated" says STREET BOYD of STEINBERG-BOYD CONSTRUCTION CO. *Tulsa, Oklahoma*

PAVING STONE

OKLAHOMA SPECIFICATIONS	CEDARAPIDS PRODUCTION % PASSING
100% passing 3"	100%
95-100% passing 2"	97.7%
70-95% passing 1½"	85.1%
50-85% passing 1"	61.7%
_____ passing ¾"	34.6%
15-40% passing ½"	19%
_____ passing ⅜"	10.6%
0-2% passing No. 4	1.9%

CLASS A

OKLAHOMA SPECIFICATIONS	CEDARAPIDS PRODUCTION % PASSING
100% passing 1½"	100%
90-100% passing 1"	98.9%
_____ passing ¾"	70.7%
25-60% passing ½"	29.7%
_____ passing ⅜"	12.4%
0-5% passing No. 4	1.4%

". . . and we're getting 180 to 250 TPH in Paving Stone— 140 to 160 TPH in Class A from our new

PORTABLE CRUSHING PLANT"

Cedarapids Built by IOWA

Here's the way to get the jump on competition for the big jobs coming up. You can hit specs right on the nose . . . outproduce any comparable plant . . . and do it at the low production costs that step up your profit.

That's one of the reasons Steinberg-Boyd is so well satisfied with their new Cedarapids Portable Crushing Plant. It's a Unitized Plant, consisting of a 2540 Portable Primary, an 1836 Twin Jaw Scalping Unit, and the brand new Cedarapids Model 30C Secondary Plant, featuring the Symons® Cone Crusher that is world famous for producing high tonnages of uniform, fine-crushed aggregate. It's a plant designed to meet the big output and exacting gradation demands of modern turnpikes and toll roads, and fit into the proposed Federal Highway Program.

Best of all, this set-up has all the features that *make money for you* on every job.

GET MORE INFORMATION FROM YOUR CEDARAPIDS DISTRIBUTOR

Junior Tandem Crushing and Screening Plant

Model CM "Commercial" Bituminous Mixing Plant

Master Bituminous Mixing Plant

Model M15 Batch-Type Bituminous Mixing Plant

THESE EXCLUSIVE CEDARAPIDS FEATURES ASSURE *BETTER GRADATION* *BIGGER PRODUCTION* *LOWER OPERATING COSTS*

● **VIBRATING GRIZZLY**
by-passes most of the undersized material and fines. Increases primary output up to 25%. Particularly effective where percentages of fines are high.

● **TWIN JAW CRUSHER**
increases primary crushing production up to 40% over single jaw units and is especially efficient in abrasive rock or gravel.

● **HORIZONTAL VIBRATING SCREEN**
steps up screening capacity because the *horizontal* position of the screen cloth gives 12½% more screening area than an inclined screen of the same length. The *full* area of the screen cloth openings are used to pass all the material that should go through, and assure accurate gradation.

SYMONS® CONE CRUSHER

The Nordberg-built Symons Cone Crusher is world-famous for big-volume, low-cost finished crushing of even the hardest or most abrasive rock or gravel to the uniform, finely-crushed aggregate required in so many specifications today. It has been proved over and over again on every job... from trap rock to limestone.

Now Cedarapids has combined the big-production, uniform-output and low-cost features of Symons Cone Crushers with Cedarapids mobility and quality construction to give you a *portable* plant with the high-profit features of a permanent installation.

SYMONS—a registered Nordberg trademark

IOWA
MANUFACTURING COMPANY
Cedar Rapids, Iowa, U. S. A.

IOWA MANUFACTURING COMPANY, Cedar Rapids, Iowa, U.S.A.
Gentlemen: Please send complete details about:

☐ Cone Crusher Secondary Plants ☐ Scalping Units
☐ Portable Primary Plants ☐ Crushers
☐ Screens ☐ Bituminous Mixing Plants

Name _____
Company _____
Address _____
City _____ Zone ____ State _____

TAPER-LOCK SOLID STEEL CONVEYOR PULLEY

1. ***DRUM DESIGN***
   — maximum strength
   — minimum weight

2. ***FULLY ENCLOSED***
   no dust — no dirt — no water

3. ***SUBMERGED-ARC PROCESS***
   — full strength in all welds

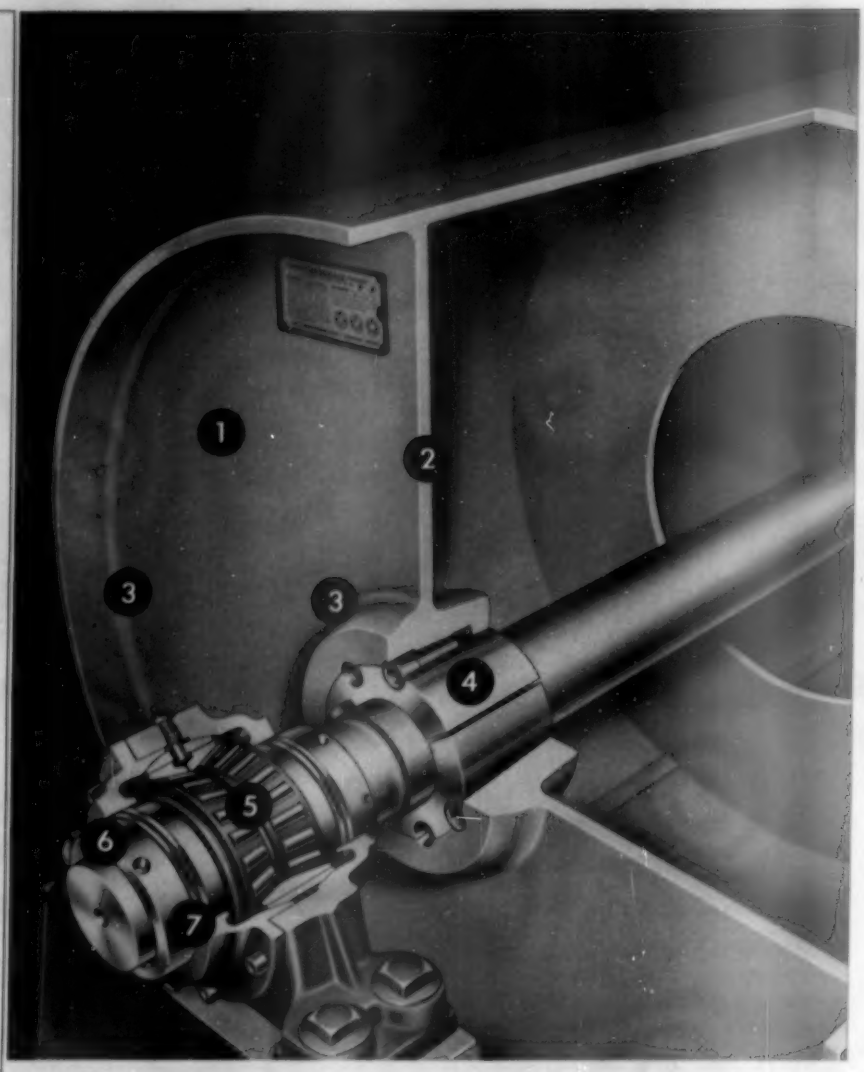
4. ***TAPER-LOCK BUSHING***
   — no walking on shaft
   — easy on — easy off!

DODGE-TIMKEN ALL-STEEL PILLOW BLOCK

5. ***NEW HEAVY-DUTY TIMKEN ROLLER BEARINGS***
   — fully self-aligning

6. ***HEAVY-DUTY ADAPTER MOUNTING***

7. ***Sealed both on and off the shaft with DOUBLE PISTON RINGS***



Here's a heavy-duty combination for tough conveyor jobs!

Pulleys from 6 in. to 8 ft. in diameter, all face widths. Bearings from 2 15/16" to 10" bores. Popular sizes stocked by our Distributors. Write for detailed information.

DODGE

of Mishawaka, Ind.

Call the Transmissioneer, your local Dodge Distributor. Factory trained by Dodge, he can give you valuable assistance on new, cost-saving methods. Look for his name under "Power Transmission Machinery" in your classified telephone directory, or write us.

DODGE MANUFACTURING CORPORATION, 2600 UNION STREET, MISHAWAKA, INDIANA

Flexible Plant Serves Two States

...designed and equipped by

TELSMITH

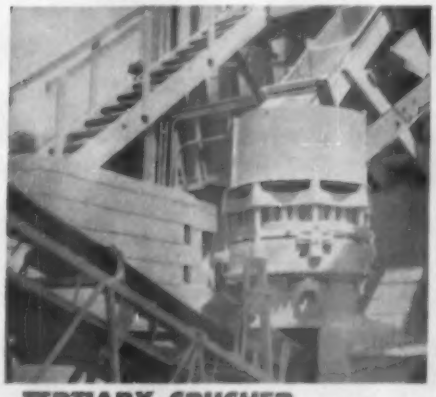
General view of plant with primary crusher house at extreme left.

D. M. Stoltzfus & Son, Inc., of Talmadge, Penn., own and operate three quarries. This is their Cedar Hills plant, at Peach Bottom, Penn., near the Maryland line. Designed and equipped by Telsmith engineers—this remarkably flexible plant produces sizes 1, 2, 6, 7, 8, 10 and 467 to meet Maryland specifications; and sizes 4, 3A, 2A, 2B, 2, 1B and 1 to meet Pennsylvania specifications. The plant easily turns out about 250 tons per hour. Find out about Telsmith Complete Plant Service. Ask for Bulletin 278.

Q-31

PRIMARY CRUSHER—30″x42″ Telsmith Jaw Crusher, served by a 42″x14′ Telsmith Heavy-Duty Apron Feeder.

SCALPING SCREEN and SECONDARY CRUSHERS—(Left) Telsmith 13B Gyratory Breaker, and (right) Telsmith 10″x36″ Jaw Crusher preceded by a Telsmith 5′ x 12′ Double Deck Heavy-Duty Scalper.



TERTIARY CRUSHER—A Telsmith 36 Standard Gyrasphere.

INTERMEDIATE SCREENS—Telsmith 4′ x 12′, 5′ x 12′ Vibro-Kings.

FINAL CRUSHER—Telsmith 36 Fine Crushing Gyrasphere.

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DEMPSTER DIGGSTER GRD-101

....only front end loader or small shovel of its type with bottom dumping bucket!

HERE IS A SMALL SHOVEL and front end loader that is fully operated by hydraulic power with independent crowd and hoist action—an excavator and loader that needs no wheel traction. It is the only shovel of its type featuring bottom dumping bucket—emptied completely and instantly!

Hydraulic crowd and hoist moves bucket out-and-up to follow contour of material—getting a full load with every stroke. This reduces both loading time and idle truck time to a minimum. Thus, gets the job done faster!

The Dempster-Diggster is the only small shovel that offers you all the important features of big shovels . . . Simultaneous and Independent Crowd and Hoist . . . Hydraulic Crowding . . . Hydraulic Hoisting . . . Variable Crowd Action at any Dipper Position in addition to Changeable Bottom Dumping Buckets for digging or loading. Write for complete facts on this revolutionary, power-packed hydraulic shovel. A product of Dempster Brothers, Inc.

Above Dempster-Diggster GRD-101 is equipped with 1½ cu. yd. loading bucket for materials-handling. Photo below shows Dempster-Diggster GRD-101 excavating with 1 cu. yd. bucket with four teeth.

DEMPSTER BROTHERS, 3125 N. Knox, Knoxville 17, Tennessee

THE NEW UNIVERSAL 293Q TWINDUAL PACEMAKER

combines peak production with maximum portability

TOP CAPACITY PRODUCTION

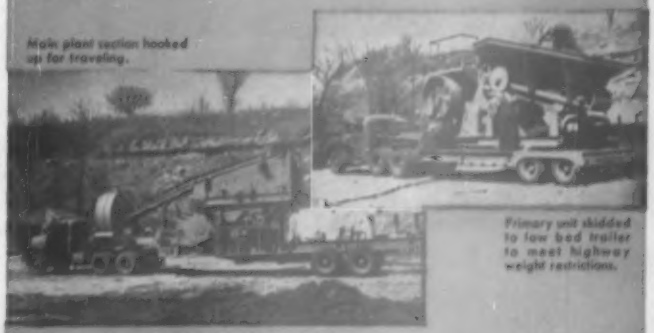
The TwinDual Pacemaker gives you three full stages of reduction for top capacity—a Universal overhead eccentric jaw crusher in the first stage and a TwinDual roll crusher for the second and third stages.

No other single unit plant offers so many big-profit advantages. Big primary jaw crusher accepts large rock—lets you work gravel pits containing big boulders. Exclusive TwinDual two-stage roll crusher gives top capacity secondary crushing. Its high ratio of reduction permits the primary jaw to operate at 50 to 100% wider discharge opening. This results in greater capacity—less jaw wear. Larger inclined gyrating screens with full screening area allow 20 to 25% greater output. All operations from apron feeder to delivery conveyor are driven through one single power unit.

For top capacity with three stages of reduction—and a bonus in longer crusher life, lower horsepower requirements and a better quality finished product, choose a Pacemaker. Available in five models for pit or quarry operation. Get complete profit making facts now.

LOW TRAVELING WEIGHT

The primary jaw crusher, apron feeder with grizzly by-pass, operator's platform and structural supports are all mounted as a single unit on skids. This primary unit is bolted to the main truck frame. When highway weight limitations must be met, this unit may be quickly skidded to a low bed trailer and transported separately.

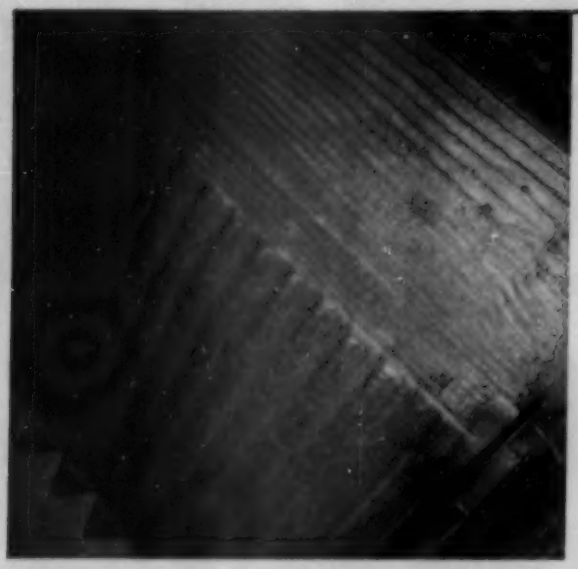


Main plant section hooked up for traveling.

Primary unit skidded to low bed trailer to meet highway weight restrictions.

PETTIBONE UNIVERSAL
In Cedar Rapids Since 1906

UNIVERSAL ENGINEERING CORPORATION
617 C Avenue N. W., Cedar Rapids, Iowa
Subsidiary of Pettibone Mulliken Corporation, 4700 W. Division Street, Chicago 51, Illinois



how to EXTEND working life of jaw crushers

apply VICTOR HARDFACING

No Disassembly This jaw crusher was hardfaced with jaws bolted in place, using 3/16" coated Tube Victorite. Despite cramped working area only 12" deep and 36" wide, high deposition rate and low spatter loss enabled welder to get uniform, non-sagging, long-wearing bead without distorting jaw.

Downtime Saver Because it goes on fast, without flux interference, and sets up quickly, coated Tube Victorite is wonderful for hardfacing on the job without disassembly of equipment.

Where To Use Coated Tube Victorite is a high alloy content rod with Rockwell C hardness of 55-58. It was developed specifically for tools subject to severe abrasion and impact, such as:

- Ripper Teeth
- Pug Mill Augers
- Jaw Crushers
- Roll Crushers
- Die Rings
- Tool Joints
- Scraper Blades
- Asphalt Mixer Paddle Shanks
- Mill Hammers
- Bucket Lips

It welds easily to carbon alloy and manganese steels—the latter frequently is used for buildup before applying coated Tube Victorite. It can be used for position welding. Deposit is smooth, even, free of pin holes. Made for AC and DC (reverse polarity) application.

Free Help—Victor hardfacing manual shows you the right rod to use and how to apply it. Ask your Victor dealer for manual and descriptive leaflets on Tube Victorite and other Victor rods . . . or write us.

Profitable dealerships open; inquire now!

VICTOR for hardfacing

VICTOR EQUIPMENT COMPANY
ALLOY ROD & METAL DIVISION
Los Angeles 59, California • Wakita, Oklahoma

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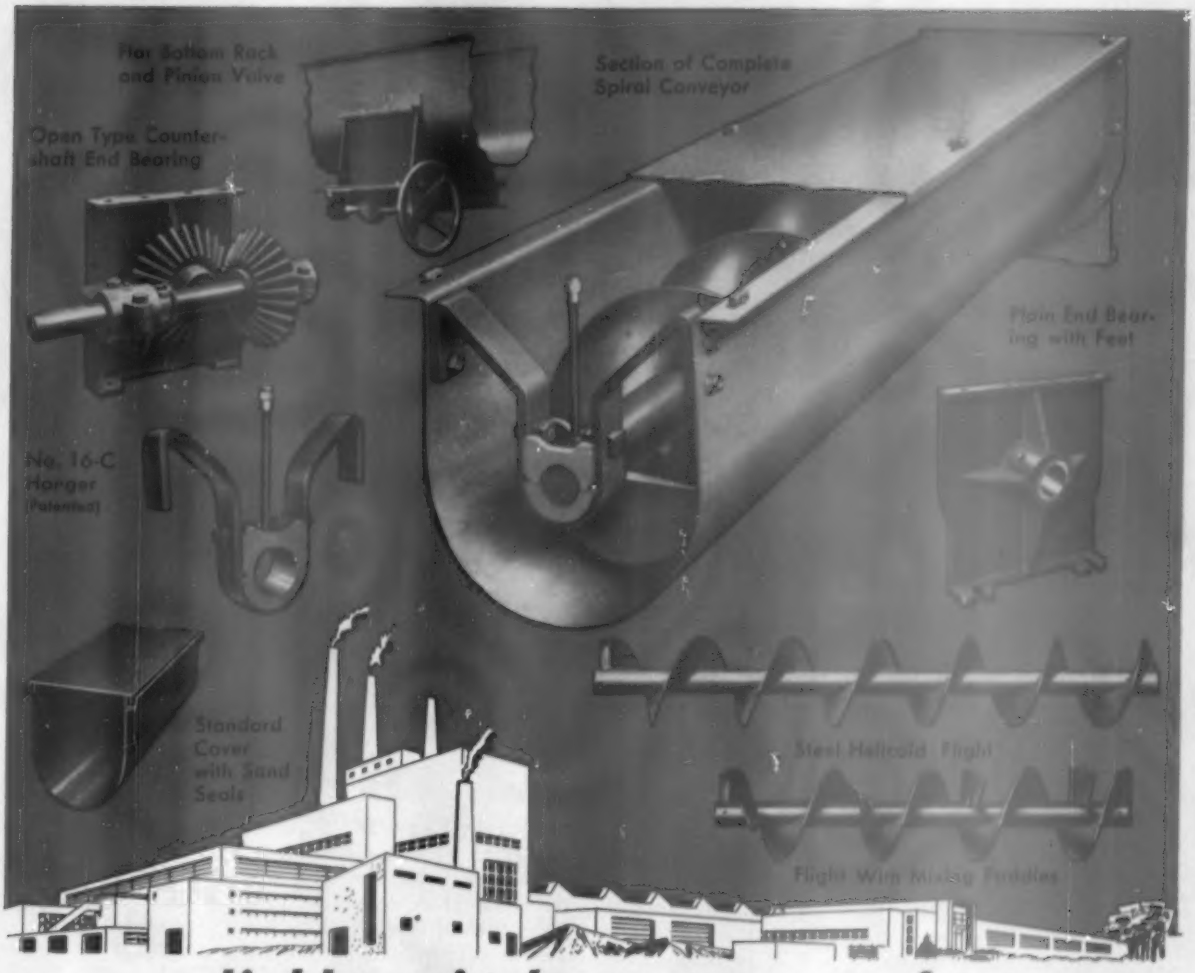
Flat Bottom Rack and Pinion Valve
Section of Complete Spiral Conveyor
Open Type Countershaft End Bearing
Plain End Bearing with Feet
No. 16-C Hanger (Patented)
Standard Cover with Sand Seals
Steel Helicoid Flight
Flight With Mixing Paddles

reliable spiral conveyor performance with JEFFREY INTERCHANGEABLE PARTS

"Down time" on a spiral conveyor costs you time and money. To help you lower both these expenses, Jeffrey maintains a healthy inventory of spiral conveyor flights, end and thrust bearings, hangers, covers, discharge openings, spouts, valves and other replacement parts.

A letter or phone call to our Merchandise Sales Division in Columbus or your nearest Jeffrey District Office or Jeffrey Distributor will get quick action. Immediate shipment of reliable Jeffrey interchangeable parts will put your spiral conveyor unit back in operation on the double. Better yet, don't wait for breakdowns, order a supply of essential Jeffrey replacements now.

Jeffrey builds all spiral conveyor components on equipment designed especially for that purpose. Uniform strength and true alignment result — every time. All flights and fittings conform to new industrial standards making them interchangeable with other standard makes.

For reliable performance, specify Jeffrey — whether the smallest renewal part or a new standard spiral conveyor engineered for your special needs.

Write for Spiral Conveyor Catalog 851.

THE JEFFREY MANUFACTURING CO.

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Columbus 16, Ohio

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PLANTS IN CANADA, ENGLAND, SOUTH AFRICA

IF IT'S MINED, PROCESSED OR MOVED . . . IT'S A JOB FOR JEFFREY!

Eagle

WASHING-CLASSIFYING PLANT GIVES MAHOMET SAND & GRAVEL CO., MAHOMET, ILLINOIS *"A competitive advantage"*

MAHOMET Sand & Gravel Co., near the bustling university and industrial centers of Champaign-Urbana, Ill., has a distinct "competitive advantage" in marketing their concrete aggregate, because it is thoroughly washed and graded to meet specifications.

No combination of modern equipment can wash and classify material as economically and thoroughly as an Eagle plant section designed for your individual job—the result of years of experience in the field.

Mahomet's plant, near Chanute Air Base at Rantoul, Ill., a pumping operation, using deep Artesian well water for washing, consists of an Eagle 32' single water scalping-classifying tank with 2-cell collecting-blending flume below the bleeder-valves on the tank. This flume discharges into the feed box of an Eagle 36" x 25' double screw fine material washer-classifier-dehydrator. Note how U-shaped long weir gives three-side overflow thus reducing velocity and increasing retention of fines. Eagles have profit-making features from end to end. Read about them—ask for Catalog 55.

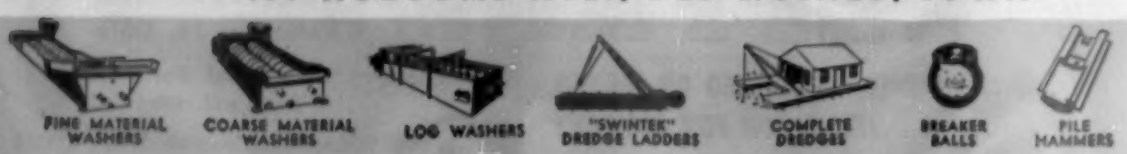
EAGLE RIBBON TYPE SCREW FOR THE BIG WASHING JOBS!

Eagle Ribbon type screws on the big washer at Mahomet have continuous one-piece flight welded to shaft. Wear resistant Ni-Hard alloy iron shoes protect working face and edge of flight—a sensible design which assures maximum service life and utmost performance.

EXPERIENCE, PROGRESS, SERVICE, SINCE 1872

EAGLE IRON WORKS

137 HOLCOMB AVE., DES MOINES, IOWA



EDITOR'S PAGE

Southern California Producers Test Legality of Pension Plans

THE STRIKE OF THE A.F.L. TEAMSTERS UNION called against twenty-nine producers of rock, sand, gravel and ready-mixed concrete in Southern California on October 3, concerns issues of far-reaching and national importance.

This has been a costly strike that paralyzed many millions of dollars of construction in the area. It likely will have been resolved before this issue is printed but, whatever the outcome, the issues and the course of action followed by the producers through their local association are of interest to the entire rock products industry.

Negotiations for a new contract had broken down and picket lines were immediately thrown around all the plants to stop production and shipments completely. A host of new demands were made on the producers, including a wage increase of 22½ cents per hour. The companies came up with an offer of 15 cents which would have been among the highest increases gained by the Teamsters Union throughout the area. In addition they agreed to new shift premiums, liberalized paid vacations and other concessions in line with the more reasonable union demands at an added cost of two cents hourly.

Many meetings of the negotiating committees, separately and together with the National Labor Relations Board, proved fruitless up to the time this is written. Wages, hours and working conditions were not involved but the key issue was the union's effort to force the employers to contribute to a pension fund. The demand was for a contribution of ten cents per hour for each employe into a trust fund administered by the Western Conference of Teamsters Pension Fund, a division of the union, with headquarters in Seattle, Wash.

Legality of Fund

The producers had many objections to contributing to the building of a multi-state pension plan covering teamsters from many other industries in eleven western states through a common fund. The welfare and protection of the employes under such a master plan was a major point in the resistance of the employers, who had no objections to bargaining for pension plans provided that such plans be tailored to the local industry and be administered locally.

The employers questioned the legality of the demand. A charge of unfair labor practices was filed by them before the N.L.R.B., which is believed to be the first case filed to test the legality of such a fund under federal law. They contended that the strike is an illegal attempt to remove the subject of pension benefits from collective bargaining procedures as provided for under the Taft-Hartley Act. They further believe that such a pension plan encourages union membership in a way not intended or permitted by law.

These charges were under study as this is written and were followed, a month after start of the strike, with a federal suit requesting five million dollars damages and a preliminary injunction to stop picketing pending settlement of the suit.

Producers' Course

Regardless of the final outcome, the southern California producers have demonstrated that an industry can make itself heard and be understood if it will stick together in resisting pressures that are considered unreasonable. There has been no break in their determination to remain united to the last, regardless of great economic loss. The smaller companies have been just as determined as the large ones to see the fight through.

None of them want a part in a plan that would cost the industry $600,000 a year, be governed by a self-perpetuating board of trustees in a remote location which represents other industries that can change the funds' provisions at any time, decide at will whether or not any union member receive a pension, and not permit the affected producers to have any voice in administering the fund.

This strike has received more publicity, possibly, than any other local strike in these industries. The newspapers have carried daily reports on the negotiations and the effects of the strike on the area's economy. Some half billion dollars of construction have been stopped or slowed.

Publicity releases, paid advertisements in contractor's publications, regular letters to employes at their homes and other means of interpretation and publicizing facts on the strike, as disseminated by the association and individual companies, have comprised a beautiful job of public relations.

It has all been of high standard and certainly has gotten the industry side of the story over to the public. There is no doubt of the public being fully aware of the industry's importance and of its sincere desire to end the strike. It has tried to make stockpiled materials available for emergency construction, only to be stymied, and companies have continued paying insurance premiums for strikers through the Christmas holiday season. Wives of strikers in mass meetings have questioned the union's motives, have demanded that workers be allowed to vote on going back to work and the local public now has a new awareness of union activities.

Bror Nordberg

Masterpieces on KRAFT

SOME OF OUR CUSTOMERS are genuinely surprised at the clean, fresh, "contrasty" colors we can produce on kraft Multiwalls.

Much is due to our painstaking efforts to develop design and color schemes best suited to the product.

Much . . . *very* much . . . is due to our exclusive Kolorseal process of printing which assures our customers fast, clean colors and perfect registration.

May we show you comparative printings made by our Kolorseal process?

We think you, too, will be surprised. . . . A line from you will bring convincing evidence to your office . . . and *without* the slightest obligation!

THE RAYMOND BAG COMPANY
Middletown, Ohio.
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MULTIWALL PAPER SHIPPING SACKS

ROCKY'S NOTES

NATHAN C. ROCKWOOD

THE NOVEMBER ISSUE contained a review of a part of the proceedings of the third International Symposium on the Chemistry of Cement, held in London, England, in 1952*. It included the papers and discussions on these constituents of portland cement clinker; tricalcium silicate and dicalcium silicate. The present part of our review and comments cover the papers and discussions on the so-called minor constituents, the alumina, iron and alkalies. These are, at the present moment, considered to have considerable influence on the properties of portland cement, but just what these may be in terms of durability is apparently still an unknown factor.

The most recent comment on this angle appears to be the 9th chapter on the "Long-Time Study of Cement Performance in Concrete" by F. H. Jackson in the October 1955 issue of the *Journal of the American Concrete Institute*. He writes that so far as resistance to freezing and thawing, as a measure of concrete pavement durability is concerned, there appears to be little or no relation to chemical composition of the cement, except that cements low in tricalcium silicate and in tricalcium aluminate may have a slight advantage.

The Aluminates

Dr. Fred Ordway, Portland Cement Association Fellowship, National Bureau of Standards, Washington, D. C., had a paper, "Tricalcium Aluminate," in which he dealt mainly with the atomic structure of this material. He said that C_3A was usually considered the third most important crystalline phase occurring in clinker, but the distinction was unmerited on a percentage basis for some cements contain little or none. The distinction is deserved, however, when the cementitious properties and structural relationships with the other phases found in clinker are considered. It is of particular interest in connection with hydration reactions.

By an original process developed by Dr. Ordway, crystals of pure C_3A were developed large enough to be systematically studied, and hence the atomic structure of C_3A has been definitely determined. His description of the apparatus used, and the methods of study of the crystal structure, were highly complimented by other scientists as opening the way for crystallographers to continue their studies of other minerals as well as the components of cement. For example, Dr. J. D. Bernal, of Birbeck College Research Laboratory, Great Britain, an internationally known expert on cement research, said: "What I hope is that we can use this method of Dr. Ordway's to study the crystal structure in its high temperature symmetrical form, we can then go down to lower temperatures and use the result to explain the greater complexities found there. I am sure this method will go far to deal with petrological problems as well as technical ones."

"The Ferrite Phase" in portland cement clinker was dealt with in a paper by G. Malquori and V. Cirilli, of Italy. By "ferrite phase," the authors explained, was meant the phase or phases in which ferric oxide (Fe_2O_3) acting as an acid is present and is bound—alone or with alumina—to calcium oxide. It occurs as a solid solution to which the general formula $2\,CaO\,(Fe, Al)_2O_3$ is to be attributed. The paper as a whole dealt chiefly with the atomic structures of these compounds.

In summarizing their results the authors state: "In the course of our experimental work we have had no opportunity to detect hydrated ferrites which were less basic than the tricalcium ferrite. Certainly these less basic ferrites do not exist in equilibrium with lime water of a concentration nearing that of saturation, and this is just the case which more closely interests the cement chemist, since the ferrite phase becomes hydrated in the presence of saturated lime water or in solutions of concentration close to that of saturation."

Myron A. Swayze, of the Lone Star Cement Corp., U.S.A., discussed this paper at considerable length, giving a summary of his work as published in the *American Journal of Science* in 1946. Those who had difficulty in grasping the meaning of much of the original paper will find this summary helpful, for it is in somewhat simpler terms. One paragraph of his discussion is readily understood even by laymen. It is as follows: "This rather high variability of the ferrite phase as to its A:F ratio in the low A:F range of mixes depending on whether or not the cooling liquid in portland cement clinker is in contact with free CaO, is disturbing to those of us who like to calculate the compound composition of cement. For cements with A:F ratio range of 1.6 and higher, and with sufficient magnesia or alkalies present to lower the invariant temperature to 1300 deg. C. or less, we can be quite safe in assuming that the ferrite phase finally crystallizing will be C_6A_2F. For A:F ratio range between 1.6 and 0.5 for commercial cements, all of which contain free lime, there seems to be little chance of predicting the A:F ratio of the ferrite phase accurately. We do know that the influence of free lime is less if it is small in quantity and not well dispersed in the clinker, and for that reason I would suggest fine raw grinding and thorough burning for cements where for reason of exposure to sulphate solutions it is desired to keep the C_3A contents to a minimum."

The Alkalies

Terry F. Newkirk, P.C.A. Fellowship at the National Bureau of Standards, U.S.A., had a paper "The Alkali Phases in Portland Cement Clinker," which was a fairly comprehensive review of the technical data as they exist at this time. It was concerned chiefly with the combinations in which the alkalies occur. It was formerly assumed that they were present as oxides, but recent research at the Bureau of Standards has shown the Na and K first combine with SO_3 from the fuel to form sulphates. Only the alkalies left over, after using up all the SO_3 are present as oxides. The SO_3 combines preferentially with the K.

One statement from his paper is: "The oxides K_2O and Na_2O although ordinarily present in only small amounts in commercial clinkers, may have a very significant effect on the potential compound composition of the clinker. This is due to the fact that each of the alkalies may enter into combination with major components of clinker to form new compounds in which the percentages of the alkali oxides are low." We would take that to mean that the alkalies are perhaps better distributed or dispersed in the clinker than the lime, and this may have a bearing on the theory of alkali-aggregate reactions as explained by Powers and Steinour.

(Continued on page 144)

*Published 1954 by the Cement and Concrete Association, 52 Grosvenor Gardens, London SW1., price $9.00.

LABOR RELATIONS TRENDS

By NATHAN C. ROCKWOOD

Supplying Sand for Icy Pavements is Interstate Commerce

THE FEDERAL COURTS are reported to be about a year behind in trying civil cases, and if the Fair Labor Standards Act case reported herewith is a fair example, the delays are easily accounted for. Also, this case shows how intricate timekeeping or bookkeeping must be, even with many a small local sand and gravel business. The U. S. District Court, District of Massachusetts, rendered its decision in the case of Hayward v. Graziano, on September 30, 1955, involving a single employe, a part of whose job was loading sand, for sanding and salting icy pavements during one winter season. Because some of these pavements carried vehicles in interstate commerce, the court took jurisdiction to enforce its interpretation of the F.L.S.A.

The Complaint

The full decision of the court follows:

"1. The plaintiff seeks to recover from the defendants unpaid overtime compensation and an additional equal amount as liquidated damages, and a reasonable attorney's fee, pursuant to the provisions of the Fair Labor Standards Act, 29 U.S.C.A. §201 et seq.

"2. The plaintiff, Myron E. Hayward, resides in Randolph, Mass.

"3. The defendants Augustine and Alexander Graziano did business as partners until December 1, 1952, when they incorporated under the name of A. Graziano, Inc. Since 1949 their place of business has been in Braintree.

"4. The plaintiff was employed by the partners beginning in 1946 and continued in the employ of the corporation through the week ending January 17, 1953.

"5. Defendants (as partners and as a corporation) were engaged primarily in the business of supplying concrete for building foundations for private residences in Massachusetts.

"6. All the cement used by defendants was purchased by them from business firms outside of Massachusetts and was shipped by railroad to a siding two miles from defendants' plant. It was then unloaded from freight cars on to the defendants' truck by defendants' employes and was brought to bins on the Graziano premises.

"7. On various jobs the defendants constructed the forms used to hold wet concrete. All of the form ties were purchased from the Pickerskill Co. of Massachusetts but were billed and paid to the Converse Steel & Wire Co. of New York, and were shipped in to defendants' place of business by Pickerskill motor trucks.

"8. During all of the work weeks specified in the complaint, the plaintiff was a 'batcher' or 'shipper.' The major portion of each work week was spent by him 'batching'—overseeing and inserting the ingredients for concrete in the defendants' concrete mixing trucks. An average of five hours or more each day was spent by him in the performance of this duty.

"9. Plaintiff in isolated instances stocked bags of cement on the premises, checked invoices against delivery and helped unload form ties. He often opened the plant in the morning, took orders on the phone occasionally and did some bookkeeping.

"10. In addition to the overtime hours complained upon, the plaintiff worked extra hours driving a truck from defendants' premises two miles to a railroad siding where he and others unloaded cement from freight cars. Each railroad car contained about 844 bags of cement. It took about three hours to unload the car, load the cement on the truck, and unload it at the yard. The plaintiff was paid a one-fourth portion (there being three other men working for him) or five cents for each bag that was unloaded and delivered. Plaintiff makes no claim for overtime compensation with respect to this work.

"11. The plaintiff's regular wage rate from March 2, 1951 through May 17, 1952 was $1.40 per hour. His rate from May 18, 1952 through December 1, 1952 was $1.50 per hour. His rate from December 2, 1952 through January 17, 1953 was $1.50 per hour. During this last period he was an employe of the corporation.

"12. The parties agreed that the following is a correct statement of the overtime hours worked and the amounts that were due the plaintiff if he was within the coverage of the Act in each and all of the workweeks set forth in the complaint.

"March 2, 1951 through May 17, 1952—1085½ hours in excess of the 40 hour week at .70 per hour—or a total of $795.85.

"May 18, 1952 through December 1, 1952—233¾ hours at .75 per hour —or a total of $175.30.

"December 2, 1952 through January 17, 1953—58¾ hours at .75 per hour—or a total of $44.05.

"[The foregoing facts are found as a result of stipulation by the parties, the agreement being embodied in the document entitled 'Case Stated.' The following facts are found, as a result of their establishment by a preponderance of the credible evidence on trial.]

"13. A sand screening plant occupied a portion of the defendant's premises in Braintree. Its function was to sort various sizes of stone and sand. Most of the sand was used in the mixing of concrete.

"14. The plaintiff was in charge of the operation of this screening plant. He started the motors each morning that it was used, saw that the hopper supply was maintained, watched for clogs, and at the end of the day after running the material out of the hoppers saw that the water was drained (if the weather demanded it) and closed the valves.

Sand for Icy Pavements

"15. From time to time some of the sand was carted to a separate pile. Sand from this pile was sold to the Commonwealth of Massachusets. Mixed with salt, it was used for sanding highways over which interstate commerce passed. The plaintiff would occasionally run the machine which piled the sand on to State trucks or trucks contracted for State use.

"16. Sand was delivered to the Commonwealth on order during the workweeks (of the plaintiff) ending January 19, 1952, February 9, 1952, February 23, 1952, March 1, 1952 and March 8, 1952.

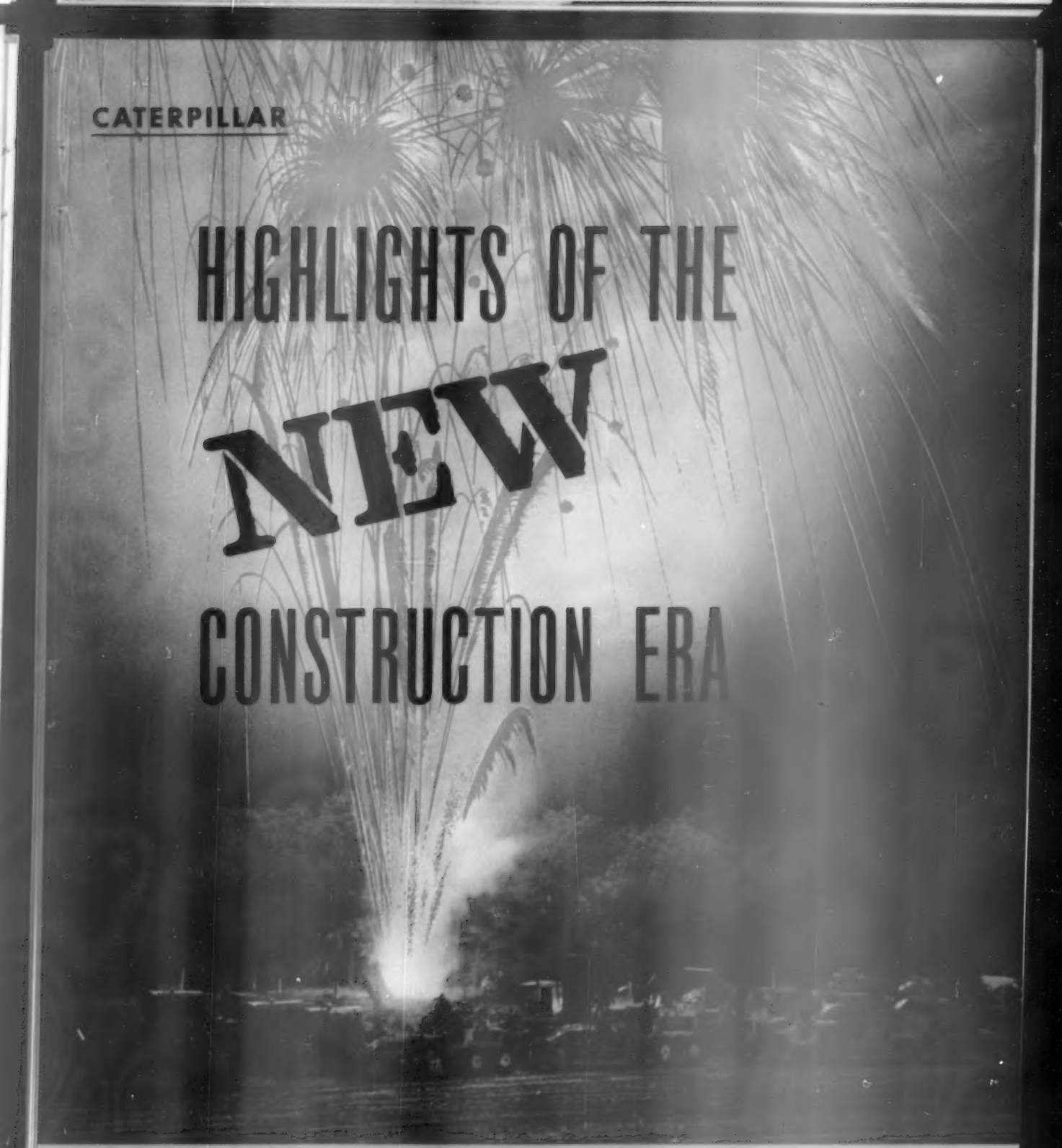
"17. The plaintiff also helped to unload form ties from truck delivering said ties to defendants' premises during his work-weeks ending November 2, 1951, November 9, 1951, November 16, 1951, April 12, 1952, April 19, 1952, July 26, 1952, and November 1, 1952.

"18. If the plaintiff is entitled to recover for the work-weeks only ending on the dates recited in findings of fact number 16 and 17, single damages would be figured on the basis of 132½ hours at 70 cents an hour for a figure of $92.75, and 28½ hours at 75 cents an hour for a figure of $21.38. Thus,

(Continued on page 148)

CATERPILLAR

HIGHLIGHTS OF THE NEW CONSTRUCTION ERA



Never before in history has the equipment industry faced such a tremendous challenge as today. We are entering what might well be called the "construction era." Right now construction is the greatest single factor in our industrial economy, employing 12% of our total labor force. And construction can never move forward by itself. Its progress is dependent upon increased production in mines and forests, cement mills and steel plants. Caterpillar Tractor Co. is matching these new opportunities with an array of new products that will increase production, cut maintenance costs, work longer and more profitably than any other equipment on the market. These Caterpillar-built products are the result of continuing research in the laboratory and in the field. They are forceful evidence of Caterpillar Leadership in Action. See them on the following pages.

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The new D9

This new giant is a bear for work. Choice of torque converter or exclusive oil clutch drive. First track-type tractor with Turbocharger. Completely new 286 HP engine. "Live-shaft" drive for rear-mounted equipment. Many other important features.

The new D8

With torque converter (Series D) or direct drive (Series E). Completely new 191 HP engine. "Live-shaft" drive for rear-mounted equipment independent of flywheel clutch. New easy controls. Many other improvements. Shown with new Cat No. 463 LOWBOWL Scraper.

The new D7 (Series C)

New 128 HP engine. Drawbar pull 28,700 lb. maximum. Exclusive oil clutch. Finger-tip steering. New starting engine for easier operation. Track shoes hardened by *"water quench"* process (also on D8 and D9). Many other important advances.

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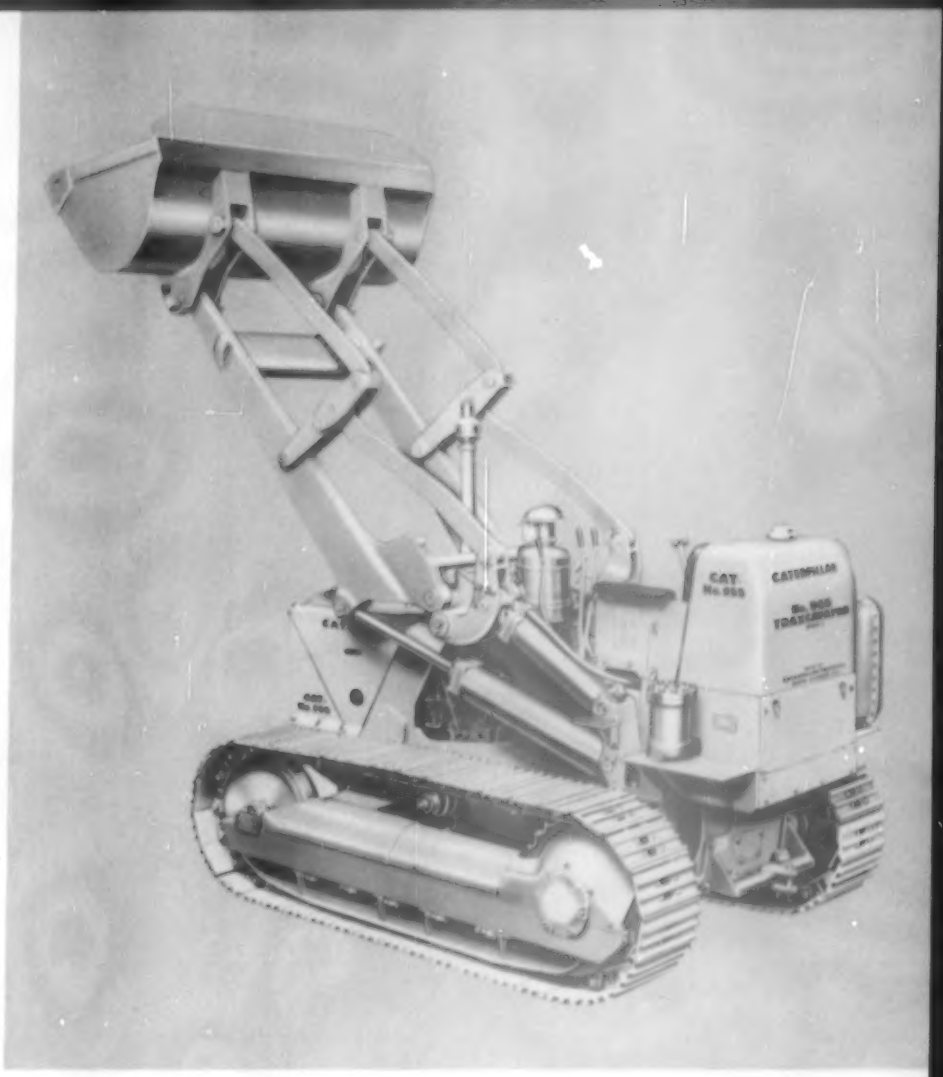

No. 955—1½-yard capacity

Balanced for bigger production at lower cost. Major features: 40-degree bucket tip-back at ground level, new oil-type clutch, convenient lift and dump levers, modern hydraulic system, high reach, "designed in" operator comfort, optional starting and versatile attachments.

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Like its bigger brother, *balanced* to outproduce ordinary tractor-shovels of equivalent capacity. Also backed by *one* manufacturer to provide you the advantages of single manufacturing responsibility and one service source. Major features—same as the No. 955!

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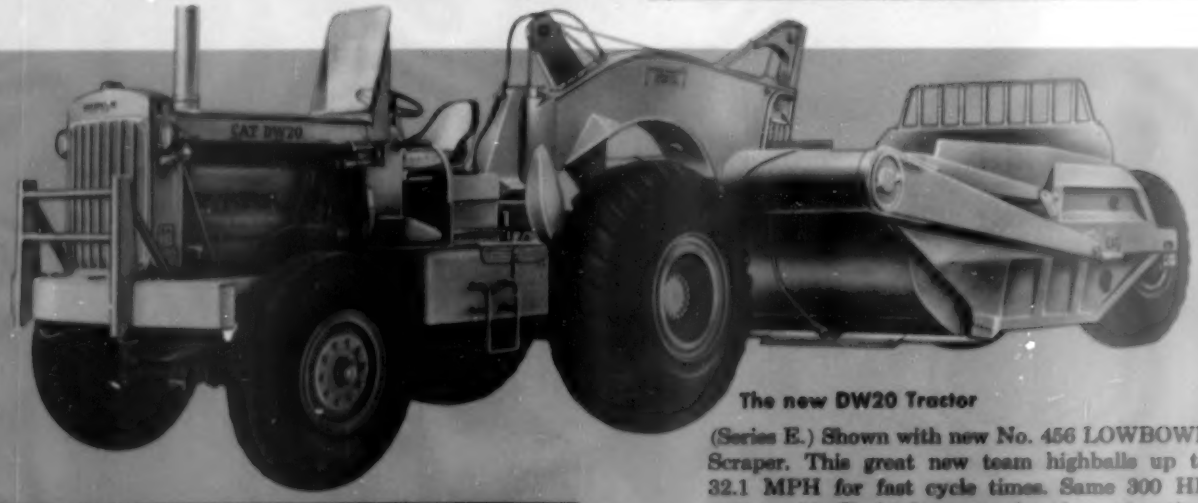
The new DW21 Tractor

(Series C.) New 300 HP Caterpillar Engine with Turbocharger. 10% more rimpull. New No. 470 LOWBOWL Scraper. 18 cubic yards struck, 25 cubic yards heaped capacity. New, wide-section 29.5-29 tires give big-footprint flotation and maximum traction. Many other new, thoroughly tested features.

The new DW15 Tractor

(Series C.) 186 HP valve-in-head Caterpillar Engine. Speeds up to 24 MPH (31.3 MPH with optional gears) pulling loaded wagon or scraper. Heavy-duty clutch has air booster. Air brakes. Wide range of speeds: 10 forward, 2 reverse.



The new DW20 Tractor

(Series E.) Shown with new No. 456 LOWBOWL Scraper. This great new team highballs up to 32.1 MPH for fast cycle times. Same 300 HP engine with Turbocharger and wide-section tires as DW21. LOWBOWL design loads more material in less time by using tractor and pusher power at maximum efficiency.

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Here, for the first time, is a pipelayer that is *all* pipelayer—not a tractor attachment. It's the most efficient, highest capacity pipelayer in history. Lifting capacity of 130,000 pounds and 21-inch clearance. Three-stage torque converter in main drive and new hydraulically actuated counterweights. Stability is unequalled. A heavy-duty constant-mesh pipelayer winch transmission drives directly from the engine. Many more important advances, all designed to produce more profits for pipeliners.

NEW in motor graders!

The new No. 12 with oil clutch

With the addition of the job-proven oil clutch, the big, versatile No. 12 Motor Grader gives you more economy and efficiency than ever. The new clutch increases work life since the constant oil bath lubrication reduces wear on all moving parts. There is less maintenance; 1500 hours without adjustment is not unusual and no external lubrication is needed. The new No. 12 is more efficient because the clutch is constantly cooled, eliminating clutch fade and slippage due to overheating.

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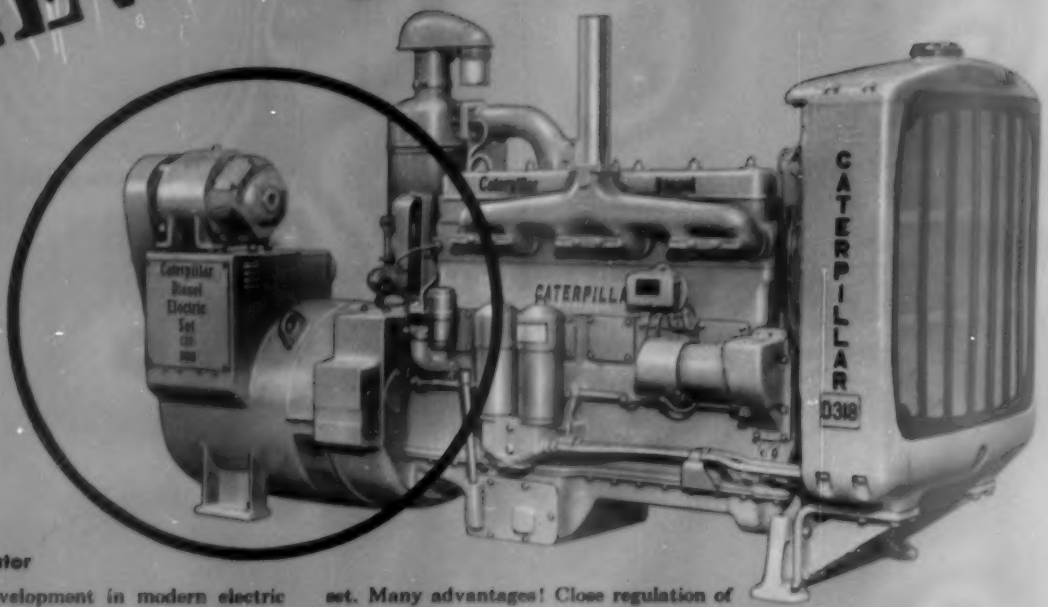

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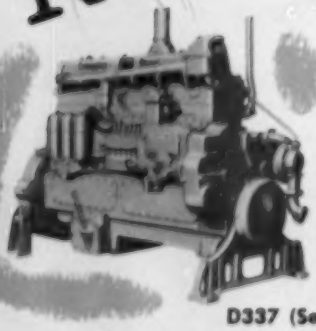
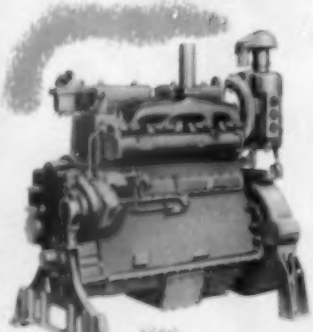
A major development in modern electric power. Brings to Caterpillar's new line of Diesel Electric Sets the efficiency of the externally-regulated set in a self-regulated set. Many advantages! Close regulation of voltage, simple control, excellent motor-starting ability, easy hook-up with other generators . . . 100% backed by Caterpillar.

NEW in diesel engines!



D342—210 HP maximum @ 1200 RPM

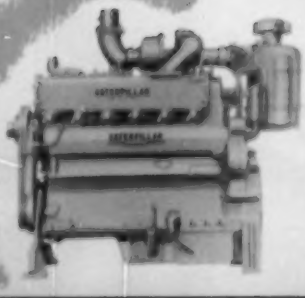
Incorporates the latest advances in modern, compact, heavy-duty diesel design. Offers better operation, less maintenance, higher horsepower. Choice of 3 starting systems—air, electric, gasoline. Like all Caterpillar Engines, burns wide range of fuels without fouling.



D339—140 HP maximum @ 1200 RPM

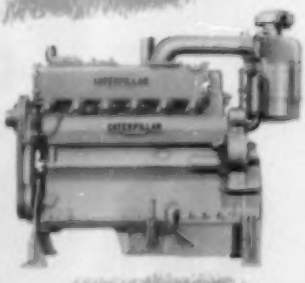
Combines new compactness with greater efficiency, economy and higher horsepower. A modern, heavy-duty 4-cylinder unit with new smoothness of operation. Choice of 3 starting systems. Many other advantages, including full-flow filtering system.

D337 (Series F) with Turbocharger 310 HP maximum @ 2000 RPM



New Turbocharger utilizes exhaust heat to drive supercharger, delivers air in proportion to engine's need. New hydraulic valve lifters practically eliminate adjustment, provide quiet operation. Greater displacement for more power. Choice of 3 starting systems. Available as Electric Sets and Industrial Engines with complete line of attachments.

D326 (Series F)—200 HP maximum @ 2000 RPM



Like other new, heavy-duty Cat Diesels, offers you more for your money than any engine in its power range. Many major features, including hydraulic valve lifters and full-flow filtering. Greater displacement for more power. Choice of 3 starting systems. Available as Electric Sets and Industrial Engines with complete line of attachments.

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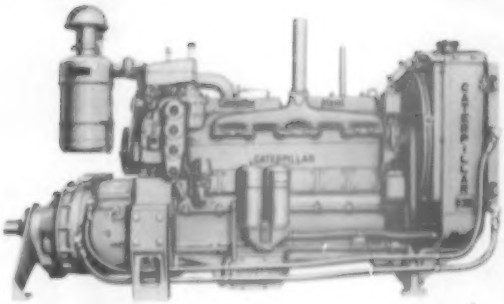
NEW in torque converters!

Caterpillar now offers a wide choice of torque converter power units in standard packages. Torque output is automatically matched to load for smooth load starts or control of load without use of clutch. Overloads can't kill engine. Your Caterpillar Dealer can supply these units. He also has full facilities and parts for service.



NEW in welders!

The new Caterpillar Twin Arc-Welder provides one engine, one base, and TWO 300-ampere welding generators. Four-cycle Cat Diesel picks up load instantly without missing or injector trouble. Compact design cuts transport and maintenance cost. Operators can weld at different voltages at same time. Single (3 KW) exciter cuts weight and size, provides ample excitation plus plenty of 115-V. DC for auxiliary tools.

NEW in portable electric sets!

Cat Portable Electric Sets are now available in nine models, 30 to 315 KW, and in all usual voltages, 50 to 60 cycle. They're complete units with cooling system, fuel tank and switchgear, mounted on skids, semi-trailer or full trailer. Easy to hook up and operate, ready to work anywhere.

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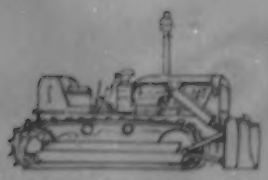
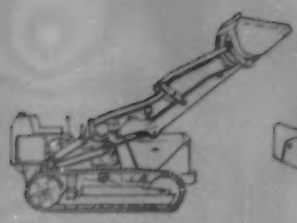


TRACK-TYPE TRACTORS

WHEEL-TYPE TRACTORS



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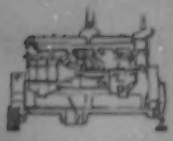
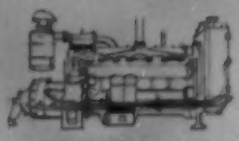


INDUSTRIAL ENGINES



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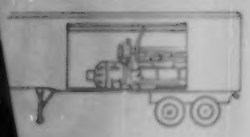

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Year after year you have seen the results of Caterpillar leadership. It is always in action. It never stands still. The full resources of Caterpillar research, both in the laboratory and right in the field with you, are constantly devoted to improving products and developing new ones. This means that Caterpillar is your partner in progress, bringing you better and better products, greater opportunities for profitable work. Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

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LEADERSHIP IN ACTION

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PEOPLE

IN THE NEWS

I.M.C.C. Appointments

THOMAS M. WARE has been elected administrative vice-president of the International Minerals and Chemical Corp., Chicago, Ill. Nelson C. White has been appointed vice-president in

Thomas M. Ware

charge of the potash division, and Carl A. Arend has been named general manager of the division. Don T. Grange has been appointed director of engineering.

Mr. Ware was formerly vice-president in charge of engineering. His new position places him in charge of engineering, purchasing, traffic, marketing, and mining and minerals exploration. A graduate of Cornell University, Ithaca, N. Y., with a degree in engineering, Mr. Ware joined International Minerals and Chemical Corp. in 1947. He has been vice-president in charge of engineering since 1952.

Mr. White is a chemical engineer with 27 years of experience in the chemical industry. He has been with the company since 1942. Formerly general manager of the potash division, Mr. White succeeds A. Norman Into, who has resigned.

Mr. Arend has been manager of the mining and chemical operations at Carlsbad, N. M., since 1949. Previously he operated the potassium chlorate plant. A chemical engineer, Mr. Arend has been with the company since 1945.

Mr. Grange has been chief construction engineer of the engineering division since 1954. He was formerly field construction manager for E. B. Badger & Sons Co., Boston, Mass.

Assistant Plant Manager

ROBERT P. JARRETT, project engineer at the Independence, Kan., plant of Universal Atlas Cement Co., New York, N. Y., has been appointed assistant plant manager at the Fairborn, Ohio, plant, succeeding James E. Jenks, who was recently promoted to assistant plant manager at the Universal, Penn., plant. Mr. Jarrett joined Universal Atlas in 1948 as an engineering trainee at the Independence plant, and was promoted to project engineer in 1951. A native of Temple, Okla., he studied civil engineering at Texas Technological College, Lubbock, Texas. After four years' service

Robert P. Jarrett

in the U. S. Army, he entered the University of Oklahoma, Norman, Okla., graduating in 1948 with a B.S. degree in civil engineering.

P.C.A. Process Director

CARL F. CLAUSEN has been appointed director of the manufacturing process department of the Portland Cement Association, Chicago, Ill. He was formerly manager of manufacturing research. Mr. Clausen, who received his M.S. degree from the Royal Polytechnic Institute in Copenhagen,

Carl F. Clausen

Denmark, joined the P.C.A. in 1947 after serving with the Pacific Portland Cement Co. in San Francisco. Prior to that he was associated with F. L. Smidth & Co., New York, N. Y. During World War II, Mr. Clausen served as chief of the Non-Metallic Building Materials Section of the War Production Board. He also served as administrator of the Cement and Cement-Transportation Limitations Orders, and as government presiding officer of the Portland Cement Industry Advisory Committee. During the Korean War he served as part-time cement industry expert in the N.P.A.

Mr. Clausen is a member of the American Institute of Mining and Metallurgical Engineers, a member of the executive committee of the Industrial Minerals Division of A.I.M.E., a charter member of the Research Committee on Comminution, and past chairman of the Cement, Lime and Gypsum Committee.

National Gypsum Promotions

LELAND R. LAYBOURN, JR., formerly mill foreman at the Medicine Lodge, Kan., plant of National Gypsum Co., Buffalo, N. Y., has been appointed mill superintendent at the Shoals, Ind., plant. After serving two years in the U. S. Army during World War II, Mr. Laybourn entered Colorado A. & M. College, Fort Collins, Colo., graduating with a B.S. degree in mechanical engineering. He joined National Gyp-

sum Co. in 1951 and for four years served as mill foreman at Medicine Lodge plant before his present appointment.

Charles E. Gouyd was named personnel and safety supervisor at Shoals in May, 1955. Born in Derby, N. Y., he is a graduate of Muskingum College, New Concord, Ohio. After two years' service in the U. S. Army, he entered Ohio State University, graduating with a M.S. degree in business administration. He joined National Gypsum Co. in 1953 as a personnel and safety trainee.

Holland Named Director

H. A. NELSON HOLLAND, chief engineer of the Raymond Concrete Pile Co., Ltd., Toronto, Canada, has been appointed a director of the company, according to an announcement by W. C. Pietz, president. A graduate of McGill University, Montreal, Canada, with a bachelor of civil engineering degree, Mr. Holland has been associated with the company since 1946. He is a member of the Engineering Institute of Canada and of the Corporation of Professional Engineers of the Province of Quebec.

Production Manager

JOHN G. STAPLER has been appointed production manager of the asbestos, cement and metal products plants of National Gypsum Co., Buffalo, N. Y. He was formerly manager of the Niles, Ohio, plant and will be succeeded in this position by Donald K. Archer, who has been assistant manager-engineer. Mr. Archer was formerly chief mechanical engineer for International Minerals and Chemical Corp., Chicago, Ill.

Manager of Sales

DONALD W. MILLER has been promoted to manager of sales of the Celo-Rok brand of gypsum products for The Celotex Corp., Chicago, Ill. He has been associated with the firm since 1948.

Donald W. Miller

Minerals Division Manager

JAMES E. CASTLE has been appointed manager of the industrial minerals division of International Minerals and Chemical Corp., Chicago, Ill. Formerly plant manager at the Kings Mountain, N. C., plant of Foote Mineral Co., Mr. Castle has had extensive mining experience in the United States and Europe.

James E. Castle

Marquette Appointments

LAWRENCE H. VROMAN has been appointed manager of engineering and construction for Marquette Cement Manufacturing Co., Chicago, Ill. Mr. Vroman, who formerly was general purchasing agent, has been associated with the company for 30 years. Edward H. Stormer is purchasing agent. James H. Howe, a member of the firm for 32 years, has been named director of operations. He was formerly assistant director of operations. Alfred E. Raae, formerly chief draftsman, has been named chief engineer; George H. Ember has been appointed chief electrical engineer; and James H. Confrey, for many years an engineer on the operations staff, has been made chief civil engineer.

Manages Standard Divisions

J. D. METCALFE has been appointed vice-president and manager of the ready-mixed concrete, aggregate, asphaltic concrete and construction divisions of Standard Industries, Inc., Tulsa, Okla., which recently purchased the Standard Roofing and Material Co., Standard Paving Co., and Acme Materials Co., Tulsa, Okla., from Charles, John L., Herbert C. and James B. Gray. Mr. Metcalfe will be assisted by R. D. Rheudasil, who has been named assistant secretary-treasurer. An engineering graduate of A. & M. College of Texas, College Station, Texas, Mr. Metcalfe was formerly associated with Tecon Corp., Dallas, Texas.

Cal Bowman, vice-president, has been named manager of the Standard Roofing and Material Co. division and H. R. Morisette has been appointed manager of the Tulsa and Muskogee operations of the division. Other division managers appointed by Standard Industries are E. B. Moubry, aggregate division; Don Denison, ready-mixed concrete; C. H. Simpson, construction, and I. S. Snead, asphaltic concrete.

Consulting Engineer

JENS C. HOLM has resigned as director of engineering for Marquette Cement Manufacturing Co., Chicago, Ill., to go into consulting engineering business for himself. He started his career in the cement industry with F. L. Smidth & Co., New York, N. Y., where he served in various capacities in the design and construction of cement plants in various parts of the world. Mr. Holm was plant manager of the Brodhead, Penn., plant of National Portland Cement Co., Philadelphia, Penn., prior to joining Marquette. He is a member of the American Institute of Mining and Metallurgical Engineers and the Danish Institute of Civil Engineers.

Executive Vice-President

FRANCIS X. DOHERTY has been appointed executive vice-president of Atlas Fly Ash, Inc., Niagara Falls, N.Y., according to an announcement by Frederick W. Reinhold, president. Formed about a year ago for the purpose of marketing fly ash collected in stacks of powdered fuel boilers, Atlas Fly Ash, Inc., is a subsidiary of the Niagara Mohawk Power Corp.

Chemical Engineer Retires

S. B. KANOWITZ has retired as chemical engineer with Combustion Engineering, Inc., after 40 years of continuous service. Well known in the rock products industries, Mr. Kanowitz plans to reside in Florida where he will do consulting work in chemical engineering.

Chief Engineer of Institute

WILLIAM E. DICKINSON, highway and concrete engineer, Calcium Chloride Institute, Washington, D. C., has been promoted to chief engineer. He has been associated with the Institute since 1946, gaining national recognition as an engineering authority on the proper use of calcium chloride in numerous industries. He has presented

technical papers at meetings of the American Road Builders' Association, American Concrete Institute and New England Testing Engineers. Mr. Dickinson holds a bachelor of civil engineering degree from Ohio State University.

On Cen-Tex Board

CHAUNCEY LEWIS, founder of the Cen-Tex Ready Mix Concrete Co., Temple, Texas, has been elected to the board of directors of the Texas Portland Cement Co., Orange, Texas, according to an announcement by Kent B. Diehl, Sr., president.

Elected Vice-President

RICHARD A. GRANT has been elected a vice-president of the California Portland Cement Co., Los Angeles, Calif. He was formerly vice-president and general counsel of Fullerton Oil Co. and president of the Oil Producers Agency of California.

General Traffic Manager

RAPHAEL J. JANER, formerly assistant traffic manager, has been appointed general traffic manager of Penn-Dixie Cement Corp., New York, N. Y. He succeeds D. S. Browder, who has retired after 27 years of continuous service.

Works Manager

LEVERN R. WILLE has been appointed works manager of the St. Paul, Minn., plant of United States Gypsum Co., Chicago, Ill. He replaces Warren Darrel, who has been transferred to the plant at Lisbon Falls, Maine.

Powell Bros. Personnel

ROBERT J. POWELL has been named president of Powell Bros., Alameda, Calif. Jean Powell Wittenau, secretary-treasurer, has been appointed vice-president to succeed Harold W. Powell who passed away recently.

Director of Dragon Cement

CHARLES H. UPSON has been elected a director of the Dragon Cement Co., Inc., New York, N. Y. He is a director of the Naugatuck National Bank and J. H. Whittemore Co., Naugatuck, Conn.

On Board of Directors

JOHN M. POMEROY, vice-president in charge of the Thomaston, Me., plant of the Dragon Cement Co., Inc., New York, N. Y., has been elected a director of the company.

Vice-President of Pabco

EDWIN W. FISH has been elected vice-president and general sales manager of Pabco Products, Inc., New York, N. Y. Mr. Fish, who joined Pabco in 1953, has been serving as vice-president and general merchandising manager. He has also served in an executive position with U. S. Gypsum Co.

Assistant Sales Manager

JOHN T. HUGHES has been appointed assistant sales manager of the New York sales territory of Universal Atlas Cement Co., New York, N. Y. A native of Cambridge, Mass., Mr. Hughes received his A.B. degree from Harvard University, Cambridge, Mass.

Joins Carter-Waters

TIP BROWN, contributing editor to ROCK PRODUCTS, has joined The Carter-Waters Corp., Kansas City, Mo., as manager of sales promotion for the company's Haydite block plant. Mr. Brown has been active in recent years in management of the Mo-Kan Concrete Products Association and the Unit Masonry Association.

OBITUARIES

BLAINE S. SMITH, retired president of Universal Atlas Cement Co., New York, N. Y., died suddenly on October 27. Mr. Smith, who had been associated with the company for more than 37 years, retired in 1953, but continued in a consulting capacity. A native of Alta, Iowa, Mr. Smith began his business career with the Chicago & Northwestern Ry. in Chicago. He joined Universal Portland Cement Co. in 1908, serving in various positions until 1928, when he became general sales manager, director and then vice-president. From 1928 to 1936, he was president and director of Penn-Dixie Cement Corp., New York, returning to Universal Atlas as president and director in 1936. A director of the Portland Cement Association since 1922, Mr. Smith was president and chairman of the board of the association in 1925 and 1926, and was elected an honorary member of the board of directors in 1954. He was a past director and treasurer of the National Association of Manufacturers. He was a member of the United States Chamber of Commerce, American Society for Testing Materials, American Iron and Steel Institute and American Road Builders Association.

Blaine S. Smith

HERBERT W. RICH, vice-president of operations, Riverton Lime and Stone Co., Inc., Riverton, Va., died October 5 at the age of 51. Born in Bayonne, N. J., Mr. Rich was graduated from Lehigh University, Bethlehem, Penn., as a mining engineer. He joined Riverton Lime and Stone Co. in 1953 as a vice-president and placed in charge of operations of the Dominion minerals division at Piney River, Va. In July of this year he was made vice-president of operations of the Riverton and Dominion divisions. Before joining the company, Mr. Rich served for eight years with Penn-Dixie Cement Corp., and prior to that was associated with United States Gypsum Co.

ALEXANDER MCKERNAN, retired superintendent of the North Branford, Conn., plant of New Haven Trap Rock Co., New Haven Conn., died recently after a brief illness. He was 87 years old. Born in Montreal, Canada, Mr. McKernan served with the New Haven Trap Rock Co. for 40 years. He was assigned to the Branford plant in 1914 to take charge of construction work, became superintendent in 1915 and served in that capacity until 1946, when he retired.

WILLIAM A. ARMSTRONG, president of the Wisconsin Granite Co., Chicago, Ill., producers of crushed stone, was drowned October 1, in Sag Channel, Palos Township, Ill., when he fell from a cabin cruiser from which he and a companion were fishing. He was 61 years old.

WILLIAM P. PENRY, founder of the Penry Stone Co., Radnor, Ohio, passed away on October 8 at his farm in Radnor Township. He was 91 years old. Mr. Penry founded the stone company 35 years ago. It is now operated by his son, Walter Guy Penry.

RUSSELL BORDEAUX, owner and operator of the Bordeaux Builders Supply Co., Oak Harbor, Ohio, died October 8 after an illness of three weeks. He was 83 years old and had operated the company for 53 years.

EUGENE S. DUNN, former assistant superintendent at the old Vulcanite Portland Cement Co., Alpha, Penn., died September 19. He was 72 years of age.

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. . . AND HERE'S WHY: All grinding balls look alike, and cost pretty much the same. This holds true for grinding rods, too. This being the case, the best way to buy is on the reputation of the manufacturer and the performance record of his products.

CF&I, for example, has an established reputation as a leading manufacturer of quality products for use in the mining industry. Having grown up in close geographical proximity to the western mining industry, CF&I has gained unmatched "know-how" in the production of grinding materials. It is this "know-how," applied at every point in the manufacturing process from ore to finished product, that assures you of getting the best when you specify CF&I Grinding Balls or Rods . . . whatever your grinding application.

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INDUSTRY NEWS

Cover Picture

THIS MONTH'S COVER ILLUSTRATION shows an aerial view of the Construction Aggregates Corp. sand and gravel plant at Ferrysburg, Mich. This unusual plant, located along the navigable Grand River near its junction with Lake Michigan, produces washed aggregates from pit-run gravel and industrial sands from dune sand barged in from separate pits. Most of the finished products are shipped by self-unloading vessels to markets bordering on the Great Lakes. Built about 25 years ago, the plant subsequently has been enlarged several times. It has a capacity of 1000 t.p.h. of washed sand and gravel and 300 t.p.h. of foundry sand.

Builds Laboratory, Offices

RIVERSIDE CEMENT CO., San Francisco, Calif., is building laboratory, office, testing and storage buildings as part of its expansion program at Oro Grande, Calif. The buildings, with a total floor area of 23,000 sq. ft. and costing $400,000, will house a laboratory, plant administration and personnel offices, sample and physical testing facilities, mining engineering offices, and a first-aid room. The buildings will be of concrete, utilizing the lift-slab method of construction, with concrete roof and floor slabs, and gunite-applied concrete walls. A garage and storage building is being built of precast concrete bents and roof panels, and concrete block. The entire group of buildings will be equipped with controls to govern heating, cooling, humidity and dust, as well as sound.

Kaiser Gypsum Expands

KAISER GYPSUM CO., Oakland, Calif., has purchased a new site at Antioch, Calif., for the building of gypsum plants previously planned for Pittsburgh, Calif. The first of the plants is being built on 38 acres fronting the Sacramento River. It is expected to be in production early in 1956, with an annual capacity of 94,000,000 sq. ft. of gypsum board products. The second of the proposed plants, producing 180,000,000 sq. ft. of gypsum board products and 20,000 tons of plaster, is scheduled for operation by August, 1956.

Claude E. Harper, vice-president and general manager, said that extensive preparations required at the Pittsburgh property would have delayed construction and production commitments by many months. The 72-acre site at Pittsburgh is being retained by the company for future development.

Honor Murphy and Ahearn

JOHN W. MURPHY, president, National Sand and Gravel Association, and Vincent P. Ahearn, executive secretary, National Sand and Gravel Association and National Ready Mixed Concrete Association, were honored October 13, at an industry dinner for them in the Music Room of the Biltmore Hotel, Los Angeles, Calif. Members of the rock, sand and gravel and the ready-mixed concrete industries in the metropolitan Los Angeles area were hosts to the members of these industries in the southwestern states and the surrounding counties of California. Over 200 were present at the dinner, at which Harold E. Bender, president, Southern California Rock Products Association, presided.

Robert Mitchell, president, Consolidated Rock Products Co., spoke on the strike of the Teamsters Union which has shut down the aggregates and ready-mixed concrete industries in the Los Angeles area. He read a statement giving the origin of causes

Industry dinner given in honor of John W. Murphy, president, N.S.G.A., and Vincent P. Ahearn, executive secretary N.S.G.A. and N.R.M.C.A. *Members of the rock, sand and gravel and ready-mixed concrete industries in metropolitan Los Angeles, were hosts*

of the strike and the policies of the industries in facing the emergency.

John W. Murphy addressed the meeting and spoke of the activities of the National Sand and Gravel Association in the interests of its members.

Vincent P. Ahearn spoke of the seriousness of the industry shut-down resulting from the Teamsters' strike, and the necessity of complete unity on the part of the employers. He also gave a picture of the political atmosphere in Washington.

Portland Cement Production

THE PORTLAND CEMENT INDUSTRY produced 27,861,000 bbl. of finished cement in August, 1955, as reported by the Bureau of Mines. This was an increase of 8 percent over the August, 1954, figure. Mill shipments totaled 31,580,000 bbl., an increase of 9 percent over the August, 1954, figure, while stocks were 12 percent less than those on hand on the same date last year. Clinker production during August, 1955, totaled 26,258,000 bbl., an increase of 7 percent over the August, 1954, total. The output of finished cement during August, 1955, came from 157 plants in 37 states and Puerto Rico. During the same period of 1954, 25,698,000 bbl. of finished cement were produced.

New Marquette Cement Plant

MARQUETTE CEMENT MANUFACTURING CO., Chicago, Ill., is building a cement plant at Milwaukee, Wis., to produce 1,250,000 bbl. annually for Wisconsin and northern Illinois markets. The plant is being built on a site in Milwaukee's industrial dock area near Lake Michigan, purchased from the Fellenz Coal & Dock Co., and is scheduled for completion by the end of 1956. The first "double pass" Lepol kiln to be installed in the United States will be incorporated in the plant, and will measure 165 ft. long, compared to 450 ft. for conventional kilns of comparable producing capacity.

Plant facilities will also include 250,000-bbl. capacity cement storage silos, a large outdoor storage area for raw materials, loading and shipping facilities, and a Marquette dock on the adjacent canal. Raw materials and fuel will be delivered directly to the dock by self-unloading water carrier. Rail transportation will be provided by the Chicago, Milwaukee, St. Paul and Pacific railroad and electric power will be purchased from the Wisconsin Electric Power Co. A sales office will be opened in Milwaukee later.

The new plant is part of an $18,000,000 expansion program, which also includes expansion of plants at Cape Girardeau, Mo., and Des Moines, Iowa. Previously considered plans for enlargement of the company's Oglesby, Ill., plant have been abandoned.

Gypsum Plant Expanded

UNITED STATES GYPSUM CO., has completed expansion of its Norfolk, Va., plant, at a cost of over $1,000,000. Plaster production was doubled, and the output of gypsum wallboard was increased by about 75 percent. A seven-story 60 x 80-ft. building was constructed to house three calcining kettles, while other improvements included additional packing equipment, a warehouse, and three additional rail sidings.

Buys Limestone Deposit

KAISER STEEL CORP., Oakland, Calif., has purchased a 10-square mile limestone deposit in San Bernardino County near Lucerne Valley, Calif., for more than $1,000,000. The site, known as the Cushenbury deposit, was formerly owned by Allen S. Vinnell and Clair W. Dunton. Tests in the area are said to indicate sufficient deposits of high-grade metallurgical limestone to meet the corporation's requirements for many decades. The deposit is 75 miles from the company's plant at Fontana, Calif., and will also supply limestone for a cement plant being built by Permanente Cement Co. at Fontana.

Artist's conception of 1,250,000-bbl. capacity cement plant being built by Marquette Cement Manufacturing Co. at Milwaukee, Wis.

Southwestern Cement Expands

SOUTHWESTERN PORTLAND CEMENT CO., Los Angeles, Calif., is expanding its cement plant at El Paso, Texas, at a cost of approximately $500,000. The expansion is expected to increase daily capacity by about 1000 to 1200 bbl. of cement. A raw material aeration system is being installed, and a new feed system for two of the four kilns is being added. Other additions include a grinding mill, a clinker handling system, dust collecting equipment, and a loading system to handle bulk shipments in both railroad cars and trucks. The expansion is scheduled for completion in February, 1956.

Plans Quarry Transfer

WEST END CHEMICAL CO., Oakland, Calif., has acquired a recently discovered limestone deposit in the Argus Range, Inyo County, Calif., north of its plant at Westend, Calif. The company plans to transfer its present quarry operations to the new site in the immediate future, and install a rotary lime kiln with a daily capacity of 170 tons. The end product will be marketed as pebble and hydrated lime.

Increases Production 300 Percent

THE HOLLY SAND & GRAVEL CO., Holly, Mich., has increased production 300 percent to peak operation at its sand and gravel plant in Oakland County, Mich. The plant was recently modernized and expanded, at a cost of about $300,000, to permit increased production of ready-mixed concrete by J. P. Burroughs & Son, Inc., the parent company.

Pavement Yardage

AWARDS OF CONCRETE PAVEMENT for the month of October were listed by the Portland Cement Association as follows:

	Sq. yd. awarded during October, 1955
Roads	2,413,196
Streets and alleys	2,533,710
Airports	1,051,811
Total	5,998,717

Expand Potash Plant

SOUTHWEST POTASH CORP., a wholly-owned subsidiary of American Metal Co., Ltd., has begun the first major expansion of its potash plant and mine at Carlsbad, N. Mex., since operations were started in late 1952.

National Gypsum Celebrates 30th Anniversary

NATIONAL GYPSUM CO., Buffalo, N. Y., celebrating its 30th anniversary, is one of America's largest corporations today, with 39 plants from Nova Scotia to California. Founded in 1925, by Joseph F. Haggerty, Clarence E. Williams and Melvin H. Baker, the company was operating its first plant at Clarence Center, N. Y., by the following spring.

The greatest period of growth for National Gypsum has been from 1950 through 1955, during which time it mined almost as much gypsum as it did from 1925 to 1950. The total gypsum mined to the present day is 30,000,000 tons, enough to build the interiors of 6,000,000 homes.

In addition to gypsum building products, the company manufactures 150 other products including paint, asbestos-cement shingles, acoustical products, insulation board, lime, metal lath products and rock wool insulation.

A five-year expansion program, costing about $75,000,000, is currently underway, with four new plants under construction and plans for others, including West Coast and Canadian plants. An article was published in ROCK PRODUCTS, December, 1950, pg. 83, on National Gypsum Co.'s silver anniversary, giving a history of the company and describing its operations. Melvin H. Baker is chairman of the board.

Inland Cement Expands

INLAND CEMENT CO., LTD., Edmonton, Alberta, Canada, has announced plans to double cement production at its plant. Construction of the first part of the plant is expected to be completed in time for the 1956 construction season, with capacity at 900,000 bbl. annually. Initial cost of the plant has been estimated at $8,000,000, and an additional $4,000,000 will be needed to expand capacity to 1,800,000 bbl. per year.

Eastern Lime Financing

EASTERN LIME CORP., Kutztown, Penn., has registered $800,000 of 6 percent 15-yr. convertible debentures and 30,000 shares ($300,000) of common stock with the Securities & Exchange Commission. Proceeds from the financings will be used by the corporation to prepay its short term notes and to set up a new limestone quarry at Oley, Penn.

Expands Cement Plant

MISSOURI PORTLAND CEMENT CO., St. Louis, Mo., has announced an expansion program for its plant at Independence, Kan., doubling its capacity to 2,400,000 bbl. of cement annually. The expansion is in addition to the project completed in 1954, and is expected to make the plant the largest of its kind between St. Louis and the West Coast. Grinding mills and a 360 ft. long kiln are being added. Dust collectors are being installed on the new kiln, as well as the kiln installed in 1954.

Buys Gravel Plant

THE CONSOLIDATED ROCK PRODUCTS CO., Los Angeles, Calif., has purchased the Canoga Rock & Gravel Co. plant in Canoga Park, Calif. The firm has built a plant to process the gravel, and plans to build another plant on the site.

Lime, Hydrate Plant

UNITED CEMENT CO., Calera, Ala., is building a plant between Calera and Montevallo, Ala., at a cost of about $750,000, producing quick lime, mason hydrate, chemical hydrate and similar products. The plant site is on the Lindbloom cattle farm. John R. Dyas is chairman of the board of directors.

Moves Offices

CHENEY LIME & CEMENT CO. has moved its offices and headquarters from Birmingham, Ala., to Allgood, Ala. The company also owns and operates plants at Graystone and at Landmark, Ala.

Purchases Gravel Firm

PORTLAND SAND AND GRAVEL CO., Portland, Ore., has been sold to Ralph E. Griffin, hauling contractor for the company. William Craswell and Mrs. Rosa M. Craswell were former owners. The company name will not be changed.

Coming Conventions

January 11-14, 1956—
American Road Builders' Association, 54th Annual Convention and Exhibit, Miami Beach Auditorium, Miami Beach, Fla.

January 23-25, 1956—
National Concrete Masonry Association, 36th Annual Convention, Roosevelt Hotel, New Orleans, La.

February 13-16, 1956—
National Sand and Gravel Association, 40th Annual Convention and Biennial Show, Conrad Hilton Hotel and Chicago Coliseum, Chicago, Ill.

February 13-16, 1956—
National Ready Mixed Concrete Association, 26th Annual Convention and Biennial Show, Conrad Hilton Hotel and Chicago Coliseum, Chicago, Ill.

February 15-17, 1956—
National Agricultural Limestone Institute, Blackstone Hotel, Chicago, Ill.

February 20-22, 1956—
National Crushed Stone Association, 39th Annual Convention and Exposition, Conrad Hilton Hotel, Chicago, Ill.

February 22-23, 1956—
Iowa Agricultural Limestone Association, 11th Annual Convention, Savery Hotel, Des Moines, Iowa.

Feb. 27-March 2, 1956—
American Society for Testing Materials, Committee Week, Hotel Statler, Buffalo, N. Y.

March 6-10, 1956—
American Concrete Pipe Association, 48th Annual Meeting, The Broadmoor, Colorado Springs, Colo.

April 12-14, 1956—
American Concrete Agricultural Pipe Association, Sixth Annual Convention, Brown Palace Hotel, Denver, Colo.

HINTS AND HELPS

PROFIT-MAKING IDEAS DEVELOPED BY OPERATING MEN

Screening and Stockpiling In One Operation

AT A LIME PLANT in the West, two rotary kilns are used, each fed by a different size stone. Each size is calcined separately and later recombined.

Light screen between two sections of belt conveyor separates stone in two sizes for different kiln feeds

An 18-in. belt conveyor, with sideboards its entire length, delivers stone to a 33-in. by 6-ft. Overstrom vibrating screen suspended near the end of the belt conveyor which feeds it. One size stone falls from the screen to the pile below and the oversize is carried by another short belt conveyor that follows to a second pile. As the vibrating screen is a light weight unit, the entire set-up can be carried on wooden conveyor frames.

Twin Scales Speed Up Truck Deliveries

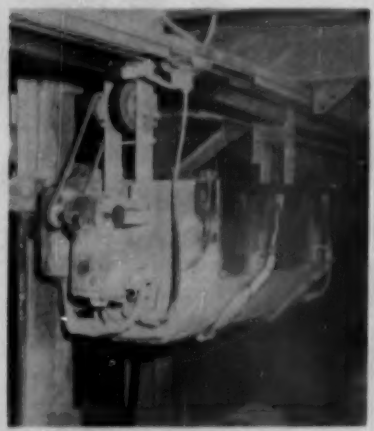
A PLANT PRODUCING in the 500 t.p.h. range, which is all shipped by trucks, has upward surges in the shipping end that can be slowed down if the bottle-neck is at the scale house. One western producer, also associated with another producer of asphalt paving materials, uses two pair of scales.

Two scales speed up movement of trucks

One set is long enough to weigh at one setting a truck and trailer and the other will handle the conventional gravel trucks. One scale house is on one side of the assembly, and the second scale-beam is in the plant office. The asphalt producer also uses both scales.

Monorail Aggregate Distributor

TO FACILITATE DISTRIBUTION of sand and gravel to several points, a western plant devised the monorail haulage unit shown in the illustration. A hard rubber tire wheel engaging the rail serves to propel the unit. The drive wheel is connected to an electric motor by a sprocket and chain drive.



Electrically propelled hopper on monorail distributes aggregates to various points in the plant

A push-button switch at the side of the hopper controls its operation. Two bottom-dump doors are provided on the hopper.

Baffles Over Conveyor

A WESTERN PRODUCER uses a 60-in. belt conveyor to deliver rock to a 42- x 48-in. Allis-Chalmers primary jaw crusher. The wide belt is kept close to the working face, and a 3-cu. yd. shovel loads direct to a field hopper under which is a Jeffrey-Traylor electric vibrating grizzly. The crusher is semi-portable.

A drop ball is used in conjunction with the 85-B shovel to break the larger pieces of rounded gravel. However, some large pieces get by the drop ball and are sent to the primary jaw crusher. To prevent "roll-back" of these boulders, several one-way baffles hang over the inclined belt conveyor. The baffles are hinged at the top so a large chunk can get through but cannot return.

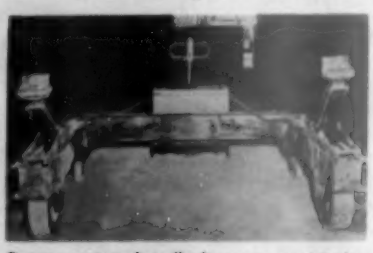
Baffles above belt conveyor prevent boulders from rolling back

Handling Cart For Large Pipe

COMBINING THE POWER UNIT of a standard battery-driven hand truck with a handling cart designed and assembled in its own shop, Faulkner Concrete Pipe Co., Jackson, Miss., came up with an answer to the problem of fast, safe movement of forms holding newly cast pipe from production to kilns for curing.

The four-wheeled, U-shaped cart, made of channel iron and flat bars, can be adjusted to handle pipe from 36 to 60-in. diameter. On each arm of the cart a conventional floor-type automobile jack was installed to lift the forms about 8 in. during travel.

Power for both travel and lifting is supplied by the drive unit of a 6000-lb. capacity Clark Powrworker hand truck, which was purchased without the regular forks but with the standard hydraulic system. An auxiliary hydraulic tank was installed to compensate for the large cylinders on the jacks and the increased lifting height necessary. The drive unit is attached to the cart with brackets and bolts.



Empty cart to handle large concrete pipe

Showing how cart is used to handle newly cast pipe and forms

Feed lines lead from the control valve on the Powrworker unit to the cylinders on the jacks. A globe valve is cut into each line so the jacks can be raised independently for leveling a load; when the valves are open, the jacks operate simultaneously. A simple butterfly lever on the Powrworker handle controls forward and reverse movement of the unit.

Pipe weighing up to 5000 lb. were previously moved with manually powered hand jacks. The new cart has saved the labor of four men. Now two men and the Powrworker do the job.

Portable Pendulum Conveyor

AT THE LARGO PLANT OF CONSOLIDATED ROCK PRODUCTS CO., located near Azusa, just east of Los Angeles, Calif., a so-called "pendulum" belt conveyor is used in the pit. Operations over the years made it advisable to open up a lower level and to move the pendulum conveyor to this level. This is no little undertaking for the pendulum installation consists of a 60-in. belt conveyor, 100 ft. centers. At one end is a loading hopper, known locally as a "can," under which is a heavy-duty Jeffrey-Traylor electrically vibrated feeder, and at the other end a 42- x 48-in. Allis-Chalmers primary jaw crusher and supporting structures. The crusher is mounted on a car with four sets of (four wheels each) standard railroad truck assemblies. This car uses a double standard gauge track on which to operate.

The pendulum conveyor is spotted in the pit so that an 85-B, Bucyrus-Erie electric shovel loads directly into the "can," and excavated material is then fed to the 60-in. belt conveyor for delivery to the crusher. Structural members are of heavy steel. The pendulum assembly works in the arc of a circle and, figuring the reach of the shovel, permits an area of about 360-ft. diameter to be mined. With a face of gravel deposit in the 75 to 85-ft. range, a large tonnage can be mined at one setting of the crusher car about which the pendulum conveyor swings. The 85-B shovel moves the can around (and this includes the 60-in. belt conveyor assembly attached to the can) to complete the excavation of a given area. Then the crusher car is moved ahead 60 ft. to start another cut with the pendulum conveyor. As the equipment is all electric power driven, the transformers also are portable, being mounted on heavy skids, as shown in the illustration. Power is delivered a distance of 3000 ft. at 4000 volts.

To make use of such heavy items of equipment meant that a pit must first be opened up and an area excavated sufficiently large enough to receive the equipment referred to above. From the primary crusher, a series of 36-in. belt conveyor flights on the floor of the pit and up an incline delivers the crushed rock to a surge pile ahead of the processing plant where both crushed rock and washed sand and gravel are produced.

One Conveyor Feeds Two

WHEN SHASTA DAM on the upper Sacramento river was built by the Six Companies, Inc., headed by the Henry J. Kaiser interests, the sand and gravel was moved from near Redding, Calif., to the dam-site on a belt conveyor system some 10 miles long. It was one of the first long belt transportation systems ever used in any industry.

Last year the old pit site was reopened as a source of commercial aggregate and a part of the old plant still was useable. The corrugated iron

Reclaiming tunnel belt conveyor may deliver to one of two diverging belt conveyors; one serving trucks and the other a batching plant

reclaiming tunnel to the right in the illustration was one of these items. The reclaiming belt conveyor feeds one of two belts, to the left. The belt conveyor in the foreground is for truck loading and the longer belt conveyor behind it delivers to a Noble batching plant adjacent to the new operations.

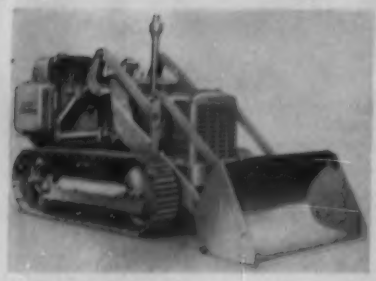
Tractor-Compressor Set-Up

THE TRACTOR SHOWN IN THE ILLUSTRATION is provided with a protective cover for the driver. The rear end of the housing is of heavy wire screen. It is a D-6 Caterpillar unit pulling an Ingersoll-Rand 315 c.f.m. compressor mounted on skids. The quarry illustrated is in a heavily timbered section where deep snows are common. Falling snow, falling trees, or falling rock from quarry operations do not have too adverse an effect on the driver, and the business end of the blade will take care of any snow, trees, or rocks that might obstruct the path of the tractor.

Tractor pulls compressor mounted on skids

Left: Vibrating feeder under "can" hopper which may be moved with the aid of shovel. **Center:** Portable transformer for use with pendulum conveyor. **Right:** Primary jaw crusher set-up mounted on four railroad trucks on double standard gauge track

NEW MACHINERY



Tractor-Shovel

CATERPILLAR TRACTOR CO., Peoria, Ill., has brought out the No. 933 Traxcavator with a 1-cu. yd. bucket, designed and built as an integral tractor-shovel. Its features include 40-deg. bucket tilt-back at ground level, large lifting capacity, in-seat starting and oil flywheel clutch. A vane-type hydraulic pump is driven from the front of the engine and is of ample capacity to permit simultaneous operation of bucket controls without loss of speed or power. The control valves are mounted inside the sealed hydraulic reservoir system. The unit has reserve speeds up to 264 f.p.m. and four forward speeds up to 528 f.p.m. Overall dimensions of the 50-hp. unit are: length, 13 ft. 10 in.; width 70 in.; height 75¼ in.; ground clearance 10 in.; and weight 15,750 lb.

Combustion Analyzer

BAILEY METER CO., Cleveland, Ohio has purchased the Cities Service "Heat Prover" combustion analyzer for oxygen and combustibles in flue gases, which is being added to the Bailey line of instruments and control equipment. It is a portable testing device for the burning of solid, liquid, and gaseous fluids, and the percents by volume of the gases in the sample are continuously and simultaneously indicated on the instrument meters. The complete package includes a sampling pump, hose and tip, as well as a thermocouple for measuring temperature. The oxygen and combustibles meters have both 40 percent and 20 percent range spans, affording greater instrument accuracy and sensitivity. The oxygen indicator is provided with an additional scale for measuring the output of the instrument thermocouple in degrees Fahrenheit.

Multiple Outlet Gear Pump

NATHAN MANUFACTURING CORP., 45-02 Ditmars Blvd., Long Island City 5, N .Y., has introduced a multiple outlet gear pump, Model Z3U, available with from two to six outlets. A divider device, controlled automatically, enables each outlet to deliver an exact measured quantity of lubricant independent of counter pressure. The pump can be supplied with reversible drive for operation in both directions, without reversible valves or flaps, thus insuring proper operation when impure liquids are used. It operates on a rotary drive with the direction of rotation controlled by an adjustable sleeve on the drive shaft. Uses include circulating lubrication of large diesel motors, gear reduction units and machine tools.

Dual Heated Screen

THE DEISTER CONCENTRATOR CO., Fort Wayne, Ind., has developed an arrangement whereby two screens are operated from a single 20 kv.a. heating transformer. The electrical hookup is such that overall power input for both screen jackets is less than where an individual transformer is used with each screen.

The short and direct runs of the bus bars continue with an unbroken circuit even when the screen jackets are changed. They are never disconnected or reconnected during any phase of operation. This permanency permits the use of heavy, oversize bus bars for economical heat transmission. There are no flexible members in the outside circuit and no parts thereof are in motion or vibration.

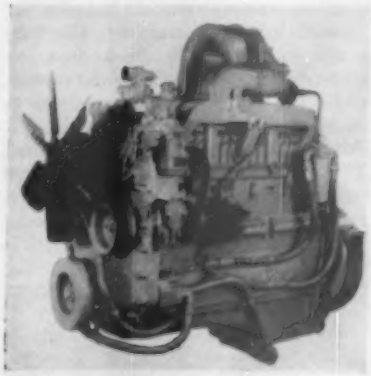
Sieve-Screen

CUSTOM SCIENTIFIC INSTRUMENTS, INC., Kearney, N. J., has brought out "Long Life Sieves," developed by Federal Portland Cement Co., Buffalo, N. Y. The sieves feature replaceable screens, eliminating the need for renewing the entire sieve-screen unit upon screen failure. The sieves are

constructed of chrome plated glass, and the screens meet A.S.T.M. specifications.

Bottom Dump Motor Wagon

ALLIS-CHALMERS MANUFACTURING Co., Milwaukee, Wis., has added a hydraulically operated bottom dump motor wagon, the TW-360, to its line of earthmoving and construction machinery. The 47,000-lb. unit is powered by a 280-hp. diesel engine providing, at 2100 r.p.m., forward speeds ranging from 3 m.p.h. in first to 20 m.p.h. in fourth gear. Reverse speed is 3.1 m.p.h. Its features include two-speed hydraulic steering; 24-volt electric system; four-wheel air brakes; simple one-lever control to operate doors which retract along the sides of the body for greater ground clearance and wider door openings; and nearly straight wagon sides to eliminate bridging of the earth.



Turbocharged Diesels

CUMMINS ENGINE CO., INC., Columbus, Ind., has announced two turbocharged diesel engines, the NTO-6 and NT-6 Turbo-diesels, for automotive, off-highway, industrial and marine applications. The NTO-6 develops 262 hp., while the NT-6 is rated at 250 hp. The maximum speed of both is 2100 r.p.m. Essentially of the same design is the 200-hp. NH-600 Cummins diesel, both the NTO-6 and NT-6 receive their increased power with the addition of a turbocharger. Both units are six-cylinder, four-cycle engines with a bore and stroke of 5⅛ x 6 in. and a piston displacement of 743 cu. in. Compression ratio for both engines is 15.5:1, while the weight for both is 2546 lb.

Fuel consumption per developed horsepower is said to be maintained at a low level in both engines because the heat used to drive the blower is not wasted. The turbochargers are available mounted either on the side or top, so that various application requirements can be met. The Cummins PT fuel system is standard equipment on the diesels, providing positive governor control for idling and maximum speed; equal fuel delivery to all cylinders; high efficiency at all loads and speeds; and equal loading of component parts.

Electrical equipment includes a 12/24 volt system with a 24-volt starting motor; 50-ampere generator; series parallel switch; voltage regulator; and push button starting switch.

Multi-Wall Repair Tape

BEHR-MANNING, Division of Norton Co., Troy, N. Y., has announced No. 131 Behr-cat Flatback, an adhesive paper tape for repairing multi-wall bags. The tape has a tensile strength of 45 lb., and an adhesive grip of 65 oz. per inch of width. Recommended application is to brush dust away from the break, apply a tape patch directly over the tear, clean the whole area with a damp cloth and allow 30 sec. to dry. Then a final piece of tape, or several pieces in a cross-hatch pattern if the tear is large, is applied.

Mobile Lab Glassware Washer

LABLINE, INC., 3070 W. Grand Ave., Chicago 22, Ill., has announced "Power-Scrub," a mobile laboratory glassware washer. It has four, motor-driven nylon brushes, with quick-acting tapered chucks. A selection of nine brushes is available, and they may be changed in a few seconds without draining the sink. The unit is a self-contained cabinet with a stainless steel sink bowl 16 x 14 x 14-in. deep, and rubber-tired casters. The vertical spiral brushes are submerged during cleaning, and special winding of bristles continually forces fresh cleaner into the glassware.

A "Power-Scrub" cleaner, for use with the washer, is specially compounded without soaps. It does not foam, froth or scum.

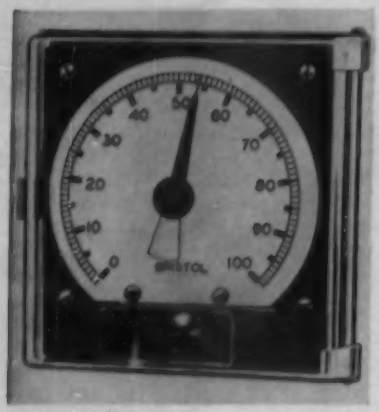
Lever-Type Grease Guns

LINCOLN ENGINEERING CO., 5702-46 Natural Bridge Ave., St. Louis 20, Mo., has introduced two high-volume lever guns equipped with a rigid hydraulic coupler extension for contacting hydraulic fittings, or with a flexible 12-in. whip hose extension with button head coupler for contacting button head grease fittings. The guns are said to deliver .17 oz. per stroke, or 6 strokes per oz. using No. 1 cup grease at 70 deg. F. The guns may be spring or force-primed, hold 21 oz. of lubricant, and include a filler nipple for refilling from a filler pump or by suction. The gun is of all steel construction, rust-proof and finished in metallic gun-metal blue. Maximum pressure of 2500 lb. is said to be developed by the guns, which are designed specially for servicing bearings requiring large quantities of lubricant.

Atmospheric Air Filtering

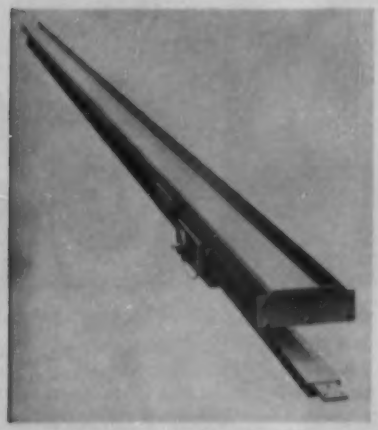
WHEELABRATOR CORP., 1062 S. Byrkit St., Mishawaka, Ind., has announced Wheelabrator Ultra-filtration, a process developed for cleaning atmospheric air with industrial-type air filtration equipment. The process uses conventional industrial "Dustube" dust collectors of the tubular cloth filter type. The filter bags are charged with a filter aid which precoats the filtering

surfaces, providing a matrix upon which the fine particles of atmospheric dust and tarry matter are collected. One application of the filter aid is said to last from two to three years under normal conditions. Shaking the spent filter air and accumulated dust from the filter bags comprises the only filter maintenance required.



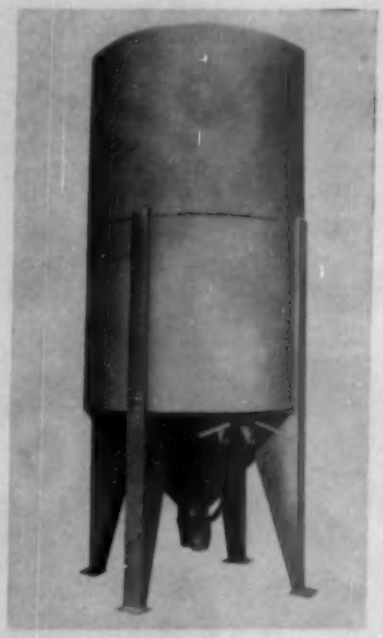
Telemeter Receivers

THE BRISTOL CO., Waterbury 20, Conn., has announced Miniaturized Metameter Telemeter receivers for use in graphic panel arrangements. The receivers are available as indicators or strip-chart recorders, and occupy a panel space 5 in. square. Designed to fit into the Metagraphic instrument line, the units can be used to receive telemeter signals of variables such as pressure, flow, temperature, differential pressure, and electrical measurements, such as voltage, current and power. The receivers use the same standard Metameter time-impulse duration mechanism as full-size models.



Mechanical Vibrating Conveyor

THE JEFFREY MANUFACTURING CO., Columbus, Ohio, has added the LMV lightweight mechanical vibrating conveyor to its line of conveying equipment. The conveyor is built in 12-ft. sections, with deck widths of 5, 8, 12, 18 and 24 in., and 14-in. maximum height from the floor. It conveys at speeds up to 45 t.p.h., depending upon the material handled. A totally enclosed, oil immersed drive is featured, preventing the entrance of foreign matter into the drive mechanism and continually splash-lubricating the eccentric and bearings.

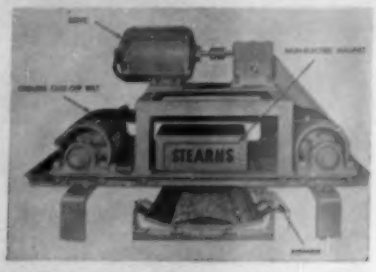


Bulk Storage Unit

ANDREWS MACHINE CO., 359 East Main, Decatur, Ill., has developed an all-steel bulk storage unit for fertilizer, feed, cement, minerals, rock phosphate and other free-flowing materials. Available in 10 or 25-ton capacities, figured on material weighing 70 lb. per cu. ft., the unit is fabricated in one piece on four legs, eliminating assembly on delivery. A hopper bottom has a swing control gate for discharge control, and an 18-in. manhole and cover for loading is located on the top with a ladder leading down the inside for easy access into the bin. It is constructed of 12 gauge steel with 16 gauge steel used for the top.

Increase Engine Horsepower

MACK TRUCKS, INC., 350 Fifth Ave., New York, N. Y., has developed a turbocharged diesel engine with a gain from 170 to 205 hp. without increase in engine size or weight or loss of fuel economy. The power increase is effected by use of an exhaust-driven turbocharger in conjunction with the Thermodyne diesel engine. The diesel engine is said to have quiet and smokeless operation, except for a short puff at starting. Also, the expansion and cooling of the exhaust before entering the muffler is said to produce a more quiet exhaust than in the naturally-aspirated type.



Self-Cleaning Magnetic Separator

STEARNS MAGNETIC, INC., Milwaukee, Wis., has introduced a line of "Discardo" crossbelt magnetic separators for removing tramp iron and automatically discharging it from the flow of material in a continuous operation. Suspended above a conveyor belt, chute, or sorting table, the Alinco V permanent magnetic compounds attract contaminating iron to the magnet face. A cleated endless belt then automatically carries it out of the magnetic field for discharge, thus eliminating frequent magnet inspection and hand cleaning. The separator is completely assembled including the integrally mounted motor-reducer drive. No electric power is required other than that necessary to drive the fractional horsepower motor. The separator is available in various sizes, suitable for suspension up to 4 in. above the material flow.

Improved Drive for Crawler-Tractor

AMERICAN TRACTOR CORP., Churubusco (Ft. Wayne), Ind., recently introduced its expanded 1956 line of TerraTrac crawler tractors and equipment, featuring Terramatic all-hydraulic instant-shift transmission and torque converter drive, as standard equipment on TerraTrac crawler tractors. A constant-mesh gear train, combined with hydraulically-operated

clutches, provides automatic shifting in any speed or direction, without loss of momentum. The unit provides four speeds forward up to 5.63 m.p.h. and four speeds reverse up to 6.2 m.p.h. The transmission also permits full power-turns with the touch of a finger, or smooth pivot-turns with hydraulic foot brakes.

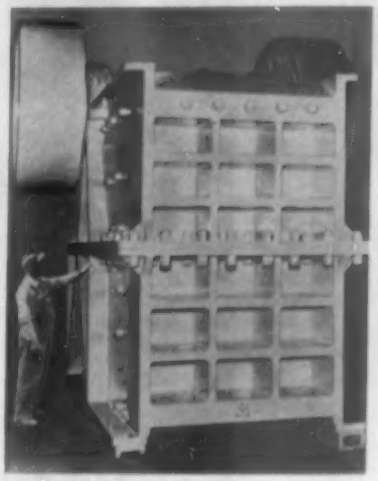
A two-stage, hydrokinetic-type converter, manufactured by the Long Manufacturing Division, Borg-Warner Corp., is especially designed for operation with Continental diesel and gasoline engines, used on TerraTrac crawlers. The converter multiplies engine torque 2.17 to 1, and the hydraulic cushioning action of the converter absorbs jolting shocks.

Aggregates Mixing Unit

IOWA MANUFACTURING CO., Cedar Rapids, Iowa, has brought out a volumetric proportioning continuous mixing type pugmill attachment, which fits under the head pulley of a delivery conveyor. It is designed to thoroughly mix water and calcium chloride with aggregate, before it is discharged from surge bins or gravel plants into a truck body. The mixing unit eliminates the need of other sprinkling or spraying equipment on road beds, and provides more accurately controlled proportioning of calcium chloride and moisture than is possible with surface mixing methods.

The mixing unit contains an 18-paddle pugmill which mixes the material and discharges it into the truck body. Also included is a 2-in. spray bar to spray the proper amount of water into the aggregate as it is mixed. The calcium chloride feeder, which is used in most installations, consists of an enclosed bin unit and a short conveyor belt to add a controlled amount of calcium chloride to the aggregate on the delivery conveyor belt. This unit is driven by the conveyor power unit. Optional equipment which adapt the unit to various road surfacing methods include a water meter, a quick-close valve, and a water pump, as well as the calcium chloride feeder.

The equipment may be added to the delivery conveyors of portable and stationary surge bins, and is available on special Cedarapids 5 and 10 cu. yd. portable bin units. With special adaptation, the unit can be fitted on the delivery conveyor belts of portable sand and gravel crushing and screening plants.



Jaw Crusher

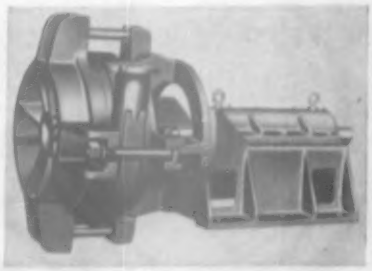
DENVER EQUIPMENT CO., P. O. Box 5268, Denver 17, Colo., has introduced the 36- x 48-in. Type "J" Denver jaw crusher with an estimated capacity of 275 to 750 t.p.h., depending on the type of rock and discharge setting, which is variable between 4 and 10 in. The frame, sectionalized for ease in handling component parts during installation, is of extra heavy electric welded 3-in. steel plate. Both sections of the crusher frame are stress relieved, before machining, and the heavy box section swing jaw is made of cast steel. The shaft of the anti-friction bearing crusher rotates in oversize double roll, self-aligning spherical roller bearings placed close together to prevent the possibility of shaft deflection.

Rerated Motor Line

GENERAL DYNAMICS CORP., Electro Dynamic Div., Bayonne, N. J., has brought out a rerated improved motor design conforming to the dimensional standards recently adopted by N.E.M.A. The design is designated as type H, and features a low air opening in the end-belt to protect the windings from liquids and abrasive dusts. Currently standard ratings are available in frame sizes 182, 184, 213, 215, 254U and 256U. The balance of the rerated N.E.M.A. line will extend to 40 hp., 3600 r.p.m. Previous designs of N.E.M.A. frames 203 through 586 are still available for those preferring larger frames.

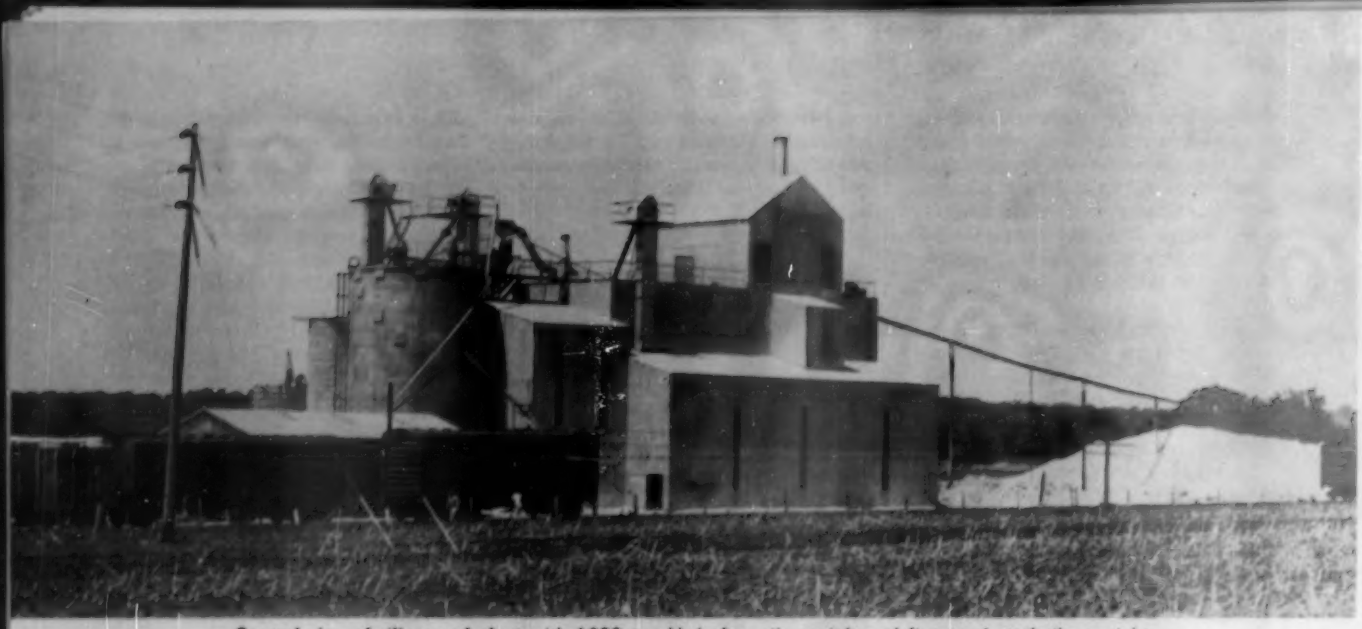
Secondary Spring Suspension

PIONEER ENGINEERING WORKS, INC., Minneapolis, Minn., has announced an optional secondary spring suspension for its larger screens, designed to eliminate vibration transfer, increase freedom of screen motion, and reduce strain on moving and structural parts. Consisting of four heavy coil springs, one in each corner of the main frame, the mounting floats the weight of the entire screen and frame. The receiving end of the mounting framework is designed to facilitate installation of conveyor supports. The secondary spring suspension mounting was developed for bin, floor and sill mounted screens in the larger sizes, where overhead spring suspension mounting applications are limited.



Heavy Duty Slurry Pump

MORRIS MACHINE WORKS, Baldwinsville, N. Y., has introduced the Type RX slurry pump, available in seven different models from 2 to 6-in. size. It is designed to handle abrasive slurries of cement, sand, coal, solids, chemical sludges, plant wastes, and other products up to the maximum of fluid consistency under suction lift of positive head. The stuffing box is said to be subject to suction pressure only; wearing parts may be reached without disturbing the piping; and the rotating element is adjustable to take up for any wear. Liners on both sides of the impeller are renewable. An outboard radial bearing provides extra capacity for high over-hung loads, and the suction and discharge nozzles swivel to meet necessary installation requirements.



General view of silica sand plant with 1000-ton Hydrafrac silo on left and fine sand stockpile on right

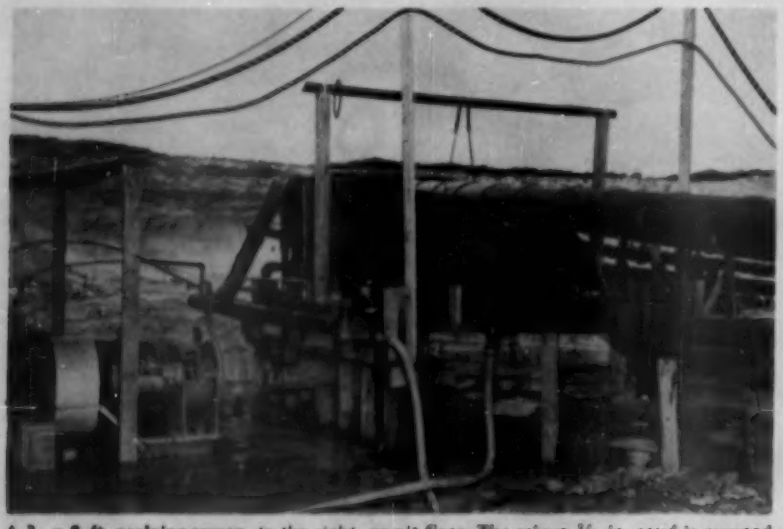
Producing SILICA SAND for the

READ ABOUT

. . . methods used by Silica Sand Corp., Ottawa, Minn., to produce a silica sand product used extensively by the oil industry in the Hydrafrac process to increase oil well production. Average application of sand per well is 4 to 5 tons, but as much as 125 tons has been used. Other products made by this company include foundry, glass, plaster and blast sands.

By KENNETH A. GUTSCHICK

THE VITAL ROLE PLAYED BY SILICA SAND in the recently-developed Hydrafrac* process for increasing oil well production was a major factor contributing to the building of the new Silica Sand Corp. plant near Ottawa, Minn. The sandstone deposit at Ottawa is especially adaptable to the process because of its exceptionally high purity and the predominance of clean, coarse-grained, rounded particles. These characteristics also make the material suitable for use in the foundry, glass, plaster, and blast sand industries.



A 3- x 8-ft. scalping screen, to the right, on pit floor. The minus ¼-in. sand is pumped to the plant

The plant is located along the main line of the Chicago, St. Paul, Minneapolis, and Omaha Ry. about 65 miles southwest of Minneapolis; it was placed in operation in November, 1954, six months after construction was started. Silica sand is mined hydraulically from a shallow pit and pumped to the plant for processing and shipment. Main plant facilities include a spiral classifier, twelve vibrating screens, a steam coil dryer, eight storage silos (including two drain silos and one mine-run silo), and a bagging department. Dust

*The Hydrafrac (hydraulic fracturing) method, developed and patented by Stanolind Oil & Gas Co., Tulsa, Okla., consists of forcing a mixture of a viscous hydrocarbon and silica sand under high pressure into a tight oil-bearing formation. The hydrocarbon fractures the formation while the sand acts as a propping agent, holding the fractures open after the pressure is released. The end result is greater permeability of the oil-bearing strata and hence increased oil production. The method is being used on old and new wells alike, and represents a fertile market for silica sand. An average application of silica sand per well is 4 or 5 tons, although as much as 125 tons has been used.

Silica sandstone quarry. Hydraulic monitor is in center of floor and scalping station and pumps are to the left. Sand is pumped 1000 ft. to plant which may be seen to the right

Petroleum Industry

is minimized through use of a large industrial fan which vents the various production units to a cyclone dust collector.

Designed by company officials, the plant has a capacity of 750 tons per day. To attain this production, the pit is operated on a one shift basis (at about 120 t.p.h.), the dryer on two shifts (80 t.p.h.), and the screening department, around the clock.

The general practice is to fill a drain silo a day, allowing the second unit to drain for a 24-hour period. In spite of severe winters, the plant is operated throughout the year.

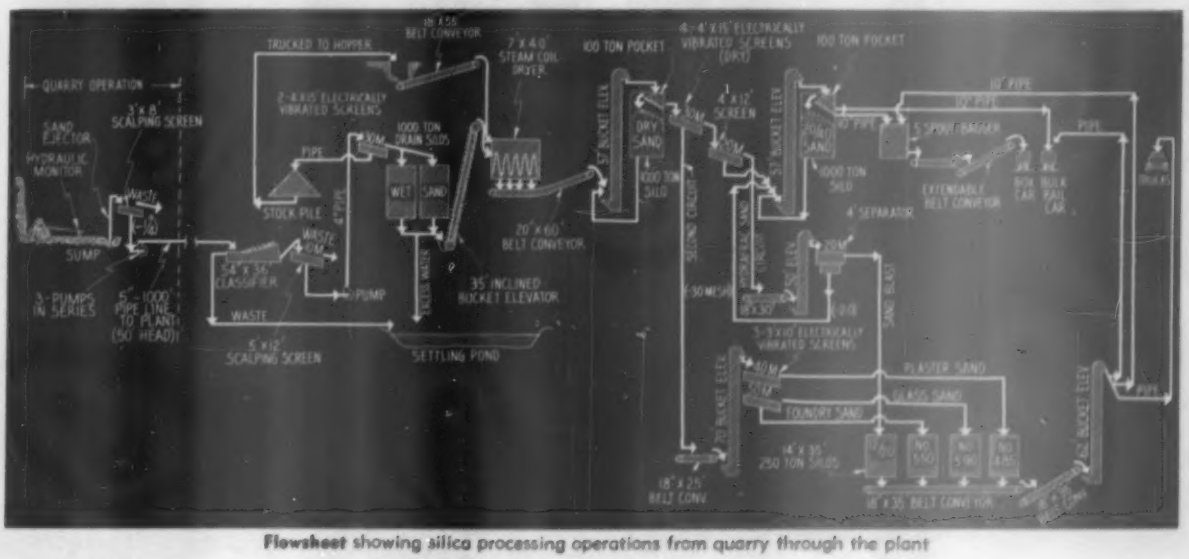
The pit, located adjacent to the Minnesota River flood plain about one mile south of Ottawa, penetrates the Jordan sandstone (upper Cambrian age). Overburden averages 8 ft. in thickness and consists of 2 ft. of glacial loam soil underlain by the Oneota dolomite (lower Ordovician), which is a brown, clayey, dolomite limestone. Because the limestone is badly fractured and weathered, the entire overburden can be removed by a Caterpillar tractor-shovel without recourse to blasting.

The Jordan sandstone is thin to massive-bedded, clean, white, poorly cemented, and friable. Most grains are rounded and frosted, the remainder being subround to subangular. Approximately 18 percent of the mined material is plus 30-mesh in size, and about ten percent is minus 100-mesh. The following is a typical analysis of the mined material:

Passing	Retained	Percent (by wgt.)	Accumulating
6	12	0.3	0.3
12	20	4.6	4.9
20	30	13.7	18.6
30	40	23.4	42.0
40	50	25.1	67.1
50	70	13.8	80.9
70	100	8.6	89.5
100	140	4.5	94.0
140	200	3.0	97.0
200	270	0.4	97.4
270	Pan	2.6	100.0

Other properties are given below:

A.F.A. grain fineness number	50
A.F.A. grain fineness classification	5.3
A.F.A. clay content	1.3



Flowsheet showing silica processing operations from quarry through the plant

Hydraulic monitor washing sand into sump where it is picked up by ejector

Fusion Point	3158 deg. F.
Sintering Point	3017 deg. F.

A typical chemical analysis follows:

SiO_2	99.77 percent	CaO	Trace
Fe_2O_3	.026	MgO	.014
Al_2O_3	.045	TiO_2	.006

Although the high purity silica sand deposit is 110 ft. thick at Ottawa, the present working face is only 35 ft. to permit a dry pit floor, which is 3 ft. above the water table. Primary blasting is seldom required because much of the rock is loosely consolidated and can be moved directly to the hydraulic monitor by a tractor-bulldozer. For occasional blast hole drilling, a truck-mounted gasoline-powered Bucyrus-Erie 21W well drill is used. Generally, three to five 6-in. dia. holes, loaded with 5-in. du Pont 30 percent gelatin and Primacord, are shot each time.

The sand is washed by a high pressure hydraulic nozzle into a sump, from which it is moved by a sand ejector (hydraulic elevator) to a 3- x 8-ft. Heyle and Roth scalping screen mounted on the pit floor. Three individual 8-in. sand ejector pipe lines are used to work the entire pit from the centrally-located scalping station. Oversize particles from the screen are wasted (also via a sand ejector), while minus ¼-in. sand is pumped 1000 ft. to the plant (50-ft. head) through a 5-in. pipe line by three rubber-lined Allen-Sherman-Hoff BC-3-5 centrifugal pumps in series. Each pump is driven by an Allis-Chalmers 40-hp. motor.

Wash water for both pit and plant operations is obtained from a nearby spring-fed pond by an Allis-Chalmers 8- x 6-in. pump, which is driven by a 100-hp. motor. An 8-in. pipe line transfers water to the plant at 75 p.s.i., and a booster 6- x 5-in. pump supplies water to the pit at 250 p.s.i. Naylor spiral weld pipe is used for carrying water throughout the operation, and steel pipe transfers the silica sand.

Sand, delivered at 30 percent solids, is initially washed and classified by a 54-in. x 36-ft. Akins spiral, which is mounted on the ground floor of the plant. The spiral has an adjustable weir and generally is set to discharge minus 150-mesh material to a 10-acre settling basin. The sand is further washed and sized on a 5- x 12-ft. Allis-Chalmers Low-Head stepped-deck screen, which has alternate screen sections (fitted with rubber ball trays) and repulping pockets (blank surfaces). The screen is fitted with woven wire cloth having 10-mesh square openings. Oversize particles are wasted, while minus 10-mesh sand is pumped 50 ft. through 4-in. pipe to the top of the plant by a 5- x 4-in. rubber-

Above: Battery of 3- x 10-ft. double-deck, enclosed electrically vibrated finish screens produce plaster, glass and foundry sands

Left: Electrically vibrated 4- x 15-ft., single-deck screens are fed directly from sand silo. Note ducts for venting dust

Initial washing in the mill building takes place in this 54-in. x 36-ft. spiral classifier

A 5- x 12-ft., stepped-deck screen which follows spiral classifier rejects 10-mesh sand

lined Allen-Sherman-Hoff B-3-5 pump.

Further scalping takes place on a pair of 4- x 15-ft. electrically-vibrated single-deck Tyler-Hum-mer screens, each screen consisting of three 4- x 5-ft. sections mounted in series. Vibration of each section is effected by a V-50 vibrator, which is supplied 6 amp. direct current by a thermionic tube-type rectifier. Both screens are fitted with Tyler Ton-Cap stainless steel wire cloth with 30-mesh oblong openings (or smaller openings if finer grades are required). Final washing is optional at this point. Presently the screen throughs are piped to an outside stockpile, and the coarser sand is chuted to either of the two drain silos. These are Neff and Fry concrete-stave 24- x 42-ft. structures, each having a capacity of 1000 tons (750 tons live). Excess water is drained through a 4-ft. layer of filter gravel to a network of 8-in. concrete drain tile, and thence to the settling pond via a 16-in. concrete pipe line. After a 24-hour drain period, the moisture content of the sand is reduced to 2 percent.

Steam Coil Dryer

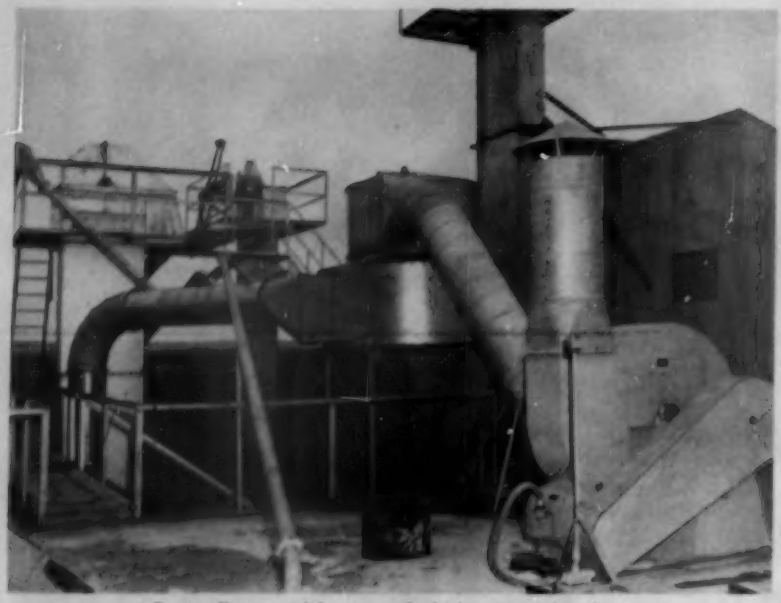
Following draining, the sand is carried by open, inclined bucket elevator to a 7- x 40-ft. concrete-lined steam coil dryer, which has a capacity of 80 t.p.h. Steam for drying is supplied at 125 p.s.i. by a 150-hp. Bros water tube-type boiler; this unit is fully automatic, burns No. 5 fuel oil, and is vented by an American Blower size 600 fan. Moisture formed during the process is drawn off through a vapor chest flanking the dryer and is vented to atmosphere by a Robins and Myers 3000 c.f.m. industrial fan.

Fine sand from stockpile can also be delivered to the dryer by means of an 18-in. x 55-ft. belt conveyor issuing from a ground level hopper adjacent to the plant. This material is processed on non-pit operating days (i.e., when the drain silos are full).

The dried sand (at 212 deg. F.) is discharged through sliding gates and carried by a 20-in. x 60-ft. belt conveyor and a 57-ft. enclosed bucket elevator to the mine-run silo. Special heat -resistant belting is used on the conveying units. This silo is identical to the drain silos, except for a pocket of 100 ton capacity used for a direct feed to the first battery of finish screens. This pocket is charged directly by the bucket elevator; and when full, the sand overflow drops into the silo proper. The same bucket elevator recirculates sand from the silo to the feed pocket.

Initial dry screening is handled by four 4- x 15-ft. electrically-vibrated single-deck Tyler Hum-mer screens which are mounted in parallel and fed by individual 2½-in. pipes. These screens are identical to the wet vibrating screens mentioned above, except that each V-50 vibrator is supplied direct current through a motor-generator set. Each screen is fitted with Ton-Cap copper-coated iron wire cloth with 30-mesh oblong openings.

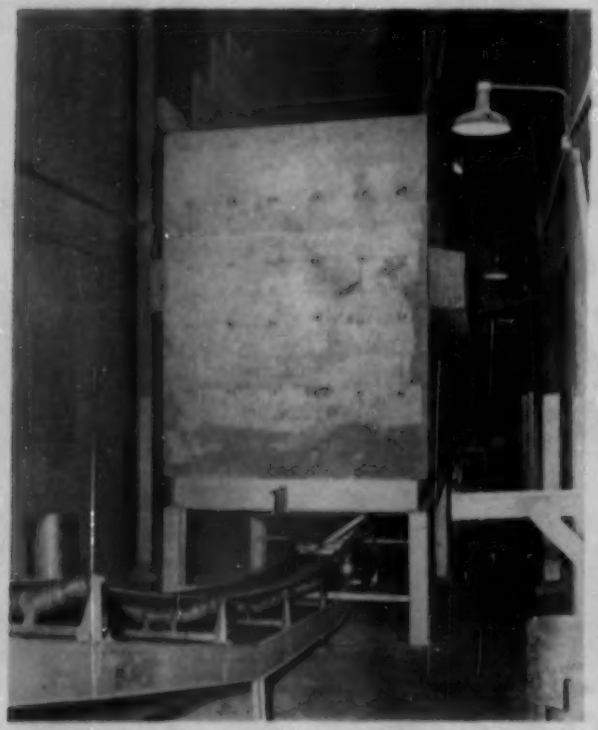
A. D. Bryant, general manager, left, and **Ray Bennington,** superintendent



Dust collector and fan on roof which vents entire plant

Two separate circuits follow the initial dry screen battery. One circuit, producing the coarser Hydrafrac and blast sands, incorporates a 4- x 12-ft. Tyler Ty-Rock vibrating screen located in the main building and a 4-ft. dia. Sweco separator located in the finish screening building; the former is fitted with 20-mesh Ty-Rod wire cloth, the latter with 20-mesh (square opening) wire cloth. The throughs from both screens, representing 20/40 Hydrafrac sand, are carried by a 57-ft. enclosed bucket elevator to a concrete-stave silo identical in construction with the mine-run sand silo. Oversize from the Ty-Rock screen is transferred via belt conveyor and bucket elevator to the Sweco separator, and oversize from the latter screen, representing 12/20 Hydrafrac sand, is gravity-fed to a 250-ton storage silo. Future plans call for making 12/30 sand on the circular screen (using 30-mesh wire cloth), in which case an additional silo will be installed.

In the second circuit, minus 30-mesh sand is carried by belt conveyor and bucket elevator to a battery of three 3- x 10-ft. electrically-vibrated double-deck Tyler Hum-mer screens. Each screen consists of two 3- x 5-ft. sections mounted in series, each fitted with a V-16 vibrator; individual thermionic tube-type rectifiers supplies 2 amp. current for the vibrators. Decks on each screen have Ton-cap copper coated iron wire cloth with 40- and 50-mesh oblong openings, respectively. Finished products include 485 (plaster) sand, 590 (glass) sand, and 550 (foundry) sand. (At Ottawa, 485 refers to 85 percent retained on 40 mesh; 590, 90 percent retained on 50 mesh, etc.). These products, and the 12/20 sand, are stored in a cluster of four 14- x 35-ft. 250-ton capacity concrete-stave silos built by the Arlington Silo Co. Sand is reclaimed from these silos by a common 18-in. x 35-ft. belt conveyor, followed (at right angles) by an identical conveyor, a 62-ft. bucket elevator, and individual feed pipes leading to rail car, truck, or the bagging machine. The 1000-ton storage silo for 20/40 sand also has a 100-ton pocket, from which the material can be piped either to the bagger



A steam coil dryer, 7- x 40-ft. which discharges sand at 212 deg. F. to conveyor. Note vapor duct on sides of unit

Interior view of dryer, looking down, showing arrangement of steam coils

Volume type, 5-spout bagging machine and sewing machine handling 100-lb. bags

4-ft. diameter circular separator for production of two grades of Hydrafrac sand

or to bulk rail cars. Conveyors and bucket elevators were supplied by Jeffrey Manufacturing Co.

The bagging machine is a Universal five-spout volume-type unit, having a capacity of twelve 100-lb. bags per minute. The 10-in. x 60-ft. pipes leading to the machine provide surge capacity. Shipments are made in either burlap or multiwall paper bags, which are sewed with a Union Specialty machine. Loading is facilitated by an electrically-driven Rapistan rubber belt bag conveying system, consisting of a 16-in. x 18-ft. unit projecting into the box car, followed by a 22-in. x (6-16 ft.) extendable and portable unit.

The Ottawa plant is of all-steel construction, with the exception of the concrete-stave silos. Corrugated steel sheathing enclosed the main building. A 24- x 108-ft. Butler prefabricated steel building houses the office, warehouse, testing laboratory, and bagging department. Both buildings are insulated. For reduction of the dust hazard, the majority of screens, conveyors, and bucket elevators are enclosed and vented via galvanized pipe to a 72-in. Day cyclone dust collector. This unit is served by a 36-in. Day, size 50 CW industrial fan. The recovered dust is wasted.

Electric power for the entire operation is brought in by a 13,600-volt line from nearby St. Peter, Minn., and reduced to 440 volts by six 100 kv.a. transformers—three located at the pit and three at the plant.

Officers of Silica Sand Corp. include R. A. Hendrickson, president; C. L. Nelson, vice-president; Walter Wieland, secretary; and Edwin Maurer, assistant secretary and treasurer. A. D. Bryant and Ray Bennington, veterans of the silica sand industry, are general manager and superintendent, respectively. Ambrose Foley is plant foreman and Ellery Potter, office manager. The plant is operated by sixteen men, including the foreman. The company is a member of the National Industrial Sand Association.

Low-Cost Caliche Roads

HELDENFELS BROS., Corpus Christi, Texas, delivers caliche from its pits along the San Antonio and Nueces rivers directly to road building projects up to 100 miles away using Hobbs-Schonrock cable-dump trailers. Hauling 15 cu. yd. at a time, these units are dumped by means of a cable which pulls the rear wheels towards the truck, thereby raising the body on lifting arms into dump position.

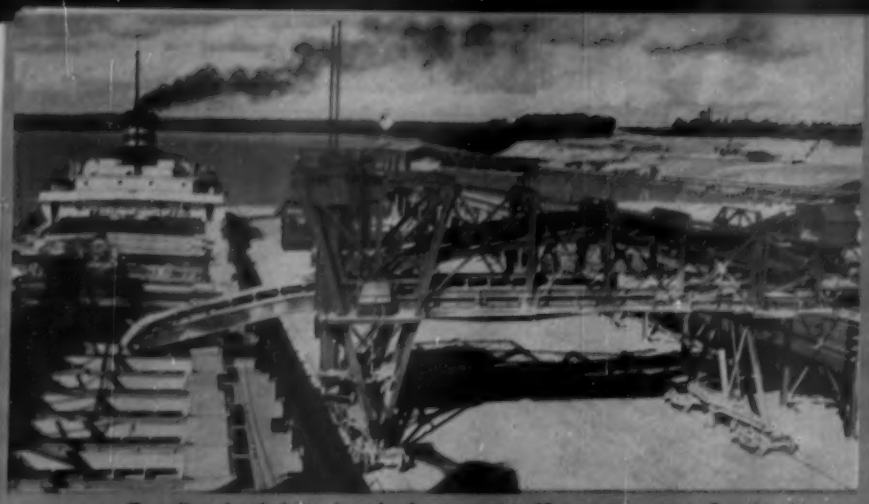
According to Fred Heldenfels, head of the company's highway building and heavy construction division, use of caliche, coupled with hauling in high capacity trailers from pit to project in one operation, permits the construction of low cost, durable highways. Caliche is reported to be good for subgrades because it acts like concrete when rolled and wet down. Generally the subbase is covered with a thin layer of asphalt, either sprayed or spread by machine. Mr. Heldenfels sees unlimited application of caliche-asphalt topped roads in the future.

Besides operating caliche pits at Mathis, Beeville and Kingsville, Heldenfels Bros. have sand and gravel plants at Victoria and Calallen.

Expands Cement Plant

GENERAL PORTLAND CEMENT CO., Chicago, Ill., is expanding its cement plant at Fort Worth, Texas, increasing capacity by 1,250,000 bbl. of cement annually. The expansion is expected to be completed by early 1956.

Cable-dump trailer delivering 15-ton load of caliche to road project



Traveling shuttle boom boat loader, mounting 60-in. conveyors, L-5 and L-6

• Michigan Limestone Division, U. S. Steel Corporation, Cedarville, Mich., plant produces 1800 t.p.h. of fluxstone and other stone products, a total of eight basic sizes. Stone from quarry is hauled by railroad, a distance of 5 miles, to the plant and dock site

By KENNETH A. GUTSCHICK

Steel Corporation Opens New Fluxstone

PROJECT CEDARVILLE—recently completed by U. S. Steel Corporation's Michigan Limestone Division, was undertaken to meet the growing need for high purity dolomite used for fluxing purposes by the nation's iron and steel industry. The new operation, which was started in April, 1955, following a two-year construction program, is located in a heavily wooded recreation area along Lake Huron in upper Michigan three miles east of Cedarville. It consists of a screening plant and dock situated at Port Dolomite on McKay Bay, which is connected by a 5-mile rail line to the dolomite quarry. The plant has a capacity of 1800 t.p.h. or 3,000,000 tons per 8-month Great Lakes navigation year, making it one of the largest crushed stone operations in the U. S.

Although the quarry and dock are entirely new, the major plant facilities were formerly part of the Thunder Bay plant of Diamond Alkali Co. located at Alpena, Mich. This docksite plant, idled since 1944, was purchased by the Michigan Limestone Division in 1948. The Cedarville project involved dismantling the Thunder Bay plant, shipping the structural steel and equipment to Port Dolomite, primarily by barge, and re-erecting the units there. However, to meet new operating conditions and to provide greater flexibility, the plant was re-engineered, and considerable new equipment and machinery was installed. Attesting to the success of this venture is the fact that full capacity has been attained during the first operating year, and this in spite of some of the most difficult quarry conditions known to the industry. During the writer's visit early in October, the plant had already produced its 2,000,000th ton of stone.

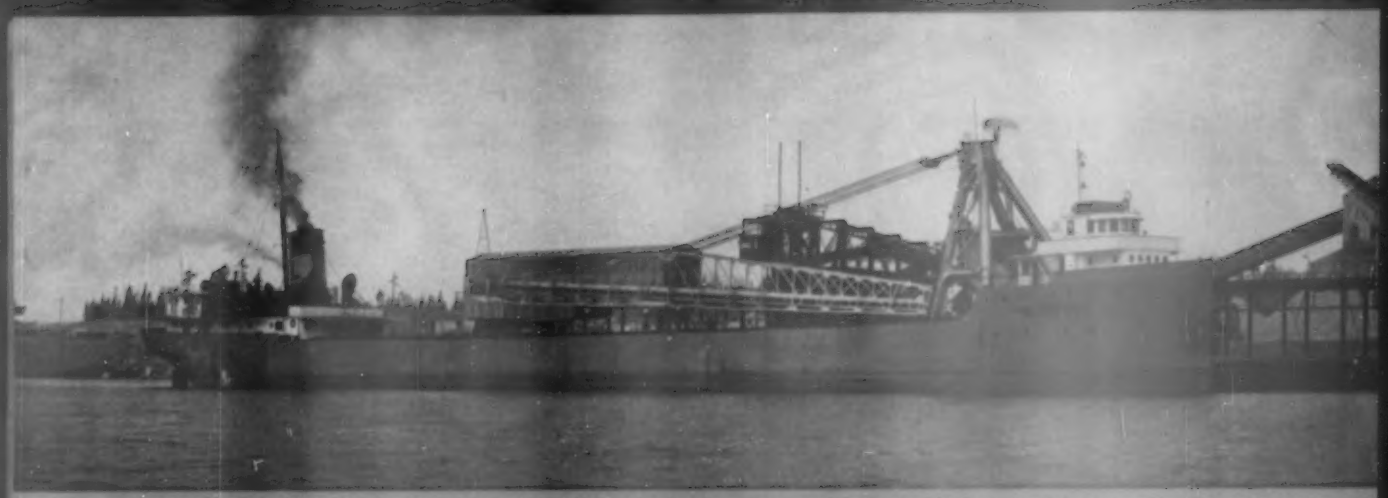
In the Cedarville operation, primary crushing is handled by a 60-in. gyratory unit installed on the quarry floor, and the crusher product is stockpiled via a 600-ft. long stacker belt over a concrete rail-car loading tunnel. The stone is transported to Port Dolomite in 14-car trains hauling 800 tons each.

General view of Cedarville plant, showing traveling boat loader and dock in foreground. In the background, from left to right; surge pile, secondary crusher building, screen house, and stocking bridge

The docksite plant comprises a primary surge pile paralleling the railroad trestle, a secondary crushing building, screen house, stocking bridge, tunnel reclaiming system, and loading dock. The mill building houses 12 double-deck sizing and washing screens, two tertiary crushers, and two stone sand classifiers and produces eight basic stone sizes, each being stockpiled by a stacker conveyor. Finished products include 5 x 3, 3 x 2, 2 x 1½, 1½ x 1, 1 x ¾, ¾ x ½, ½ x 8 mesh, and minus 8 mesh stone, all of which are thoroughly washed. All sizes can be varied to exact specifications. The three larger sizes represent fluxstone, and are later blended with high calcium limestone for blast furnace use.* The ½ x 8 mesh size, called rice, is used as a refractory material in the lining of open hearth furnaces. The other basic sizes are sold as construction aggregates.

The stockpile reclaiming system includes a main tunnel conveyor leading to the dock and two identical lateral tunnel conveyors, by means of which the various stone sizes can be loaded singly or blended. The dock, connected to the mainland by a short causeway, has a travelling ship loader with a capacity of 2800 t.p.h. This unit combines shuttle and boom movements which permit the vessel load to be trimmed while lessening the stone drop, thereby minimizing degradation. Presently all shipments are made via

*Use of dolomite in blast furnace operation has been increasing, and many steel producers today require 6-8 percent MgO in fluxstone. Since the Cedarville deposit contains 21 percent MgO, it is necessary to blend this stone with high calcium limestone. This blending occurs either at Michigan Limestone Division's high calcium limestone operation at Rogers City, Mich., or at steel company plants.



Str. Calcite, the Michigan Limestone Division's first self-unloader, taking on first load of high purity dolomite at Port Dolomite on April 16, 1955

Plant In Michigan

Great Lakes freighters, since the plant lacks commercial rail facilities.

Quarry and plant location were based on extensive geological studies made for the company as far back as the early 1940's. The quarry is developed in the Engadine dolomite formation (Niagaran or Middle Silurian age), which occurs in the area in an 8-10 mile wide band paralleling the Lake Huron shoreline. However, in most of the area the deposit is either too siliceous (and thus unsuitable for fluxstone) or is covered with excessive overburden. At the present quarry site, however, the stone is of exceptional high purity, containing nearly 100 percent calcium and magnesium carbonates (average of less than 0.2 percent SiO_2); and the overburden is less than 5 ft. thick.

Location of the screening plant and dock on McKay Bay was based on the presence of a natural channel a few hundred feet offshore which could accommodate even the largest of Great Lakes freighters. Ample protection from weather during boat loading was provided by several offshore islands. Proximity to water for stone washing was also an important factor in selecting this site.

Quarrying Operation

Quarrying at Cedarville is a very difficult operation due to an extremely rough, honeycombed bedrock surface coupled with a massive, highly jointed dolomite formation. The bedrock surface consists of a series of glacial-scoured ridges or knolls rising as much as 10 ft. above the intervening gouged-out channels, thus making it precarious for even a tractor-bulldozer to maneuver. In order for drilling and stripping machines to set up, considerable rock fill must be placed. Stripping is carried out in two phases—first timber cutting (generally a winter operation) followed by stump and overburden removal. Overburden, comprising 0-5 ft. of glacial soil and boulders, is excavated by crawler-mounted machines, including a Bay City Model 30 backhoe and a Link-Belt crane fitted with a 1½-cu. yd. digging clamshell bucket; the material is trucked to a dumping area.

In the Cedarville area, the Engadine formation consists of four dolomite members, designated by Michigan Limestone as E1, E2, E3, and E4 (from oldest to youngest). Both the E1 and E2 beds contain high purity dolomite. The two other members are too siliceous for fluxstone usage. The M.L.D. quarry penetrates the upper 45 ft. of the E2 member, which averages 70 ft. in thickness in this area. The quarry face is developed at 45 ft. to enable the quarry trucks to haul at grade to the primary crusher. The quarried material is massive (has widely spaced bedding planes), coarsely crystalline, and is light gray to white in color. It is excellent for use as fluxstone and agstone and also suitable as concrete and bituminous aggregates. The bedrock is highly jointed, with most joints striking roughly east-west and dipping to the south at about 45 deg. (In comparison, the dolomite strata also strike east-west, but dip only about 1 deg. to the south, or about 100 ft. per mile).

Top Drilling Method Used

Due to the massiveness and the sharp angle jointing of the dolomite, and the rough bedrock surface, primary blasting is a tough proposition. To effect maximum breakage of the upper strata, the company combines top drilling with conventional primary blast hole drilling. A typical primary shot consists of 40 single-row primary holes (6¼-in. dia.) drilled on a 16- x 18-ft. pattern and 160 satellite holes (2⅜-in. dia.) drilled 10 ft. deep and roughly on 4-ft. centers; the entire charge is detonated using millisecond delay caps. Primary drilling is handled by two Joy 58 BH electric rotary drills using Hughes tri-cone 6¼-in. dia. bits, while the satellite holes are put down with two Gardner-Denver

Surge pile along railroad trestle with secondary crusher building in foreground. Conveyors S-2 and S-3, to the left of building, return oversize to secondary crusher

Train emerging from reclaiming tunnel under primary surge pile (10,000-ton live storage) at quarry site

Air-Trac wagon drills carrying 2⅛-in. drill steel with tungsten-carbide rock bits. Each wagon drill is mounted on crawler-tracks and is self-propelled, thereby permitting the unit to move itself as well as its portable air compressor. This is an especially important feature on rough terrain. For maximum breakage, the satellite holes are staggered and generally placed at the bedrock knolls. Drilling rates average 15½ f.p.h. for the rotary drills and 37½ f.p.h. for the wagon drills.

For primary holes, an ammonium nitrate explosive and 40 percent gelatin (5½-in. cartridges) are used, being loaded solid (with 14 ft. of stemming.) Deck loading (2 x 16 cartridges) is followed in the secondary holes. Primacord and Primacord m.s. connectors detonate the explosives. Generally, each set of 3 or 4 satellite holes is connected to the primary hole immediately ahead in the shot; this hookup eliminates the possibility of the detonator being severed. Double Primacord trunk lines and double connectors for each primary hole are standard practices to guard against possible misfirings.

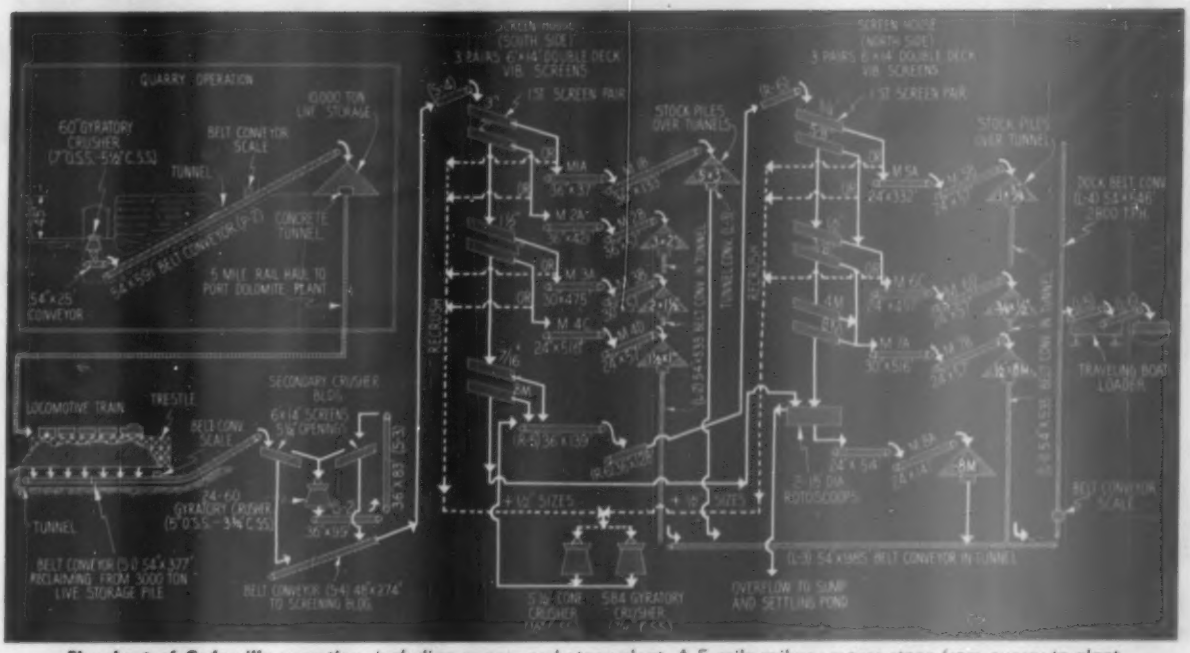
Secondary drilling is handled by a Travel Drill, which is a self-propelled (rubber-tired) self-contained drilling rig. The operator, who runs the entire machine, works from a cab suspended at the end of a 40-ft. boom; this arrangement facilitates block-hole drilling over the entire muck pile. Quarry loading is done with two 8-cu. yd. Bucyrus-Erie 190B shovels, loading a fleet of eight Euclid 22-ton trucks. A 5-cu. yd. Marion 4161 shovel is available to supplement the larger units as needed. As an experiment, two of the trucks have been fitted with side boards, and initial studies indicate a stepped up cycle time because of less spillage on the quarry roadways. Rounding out the quarry equipment are two Caterpillar D8 tractor-bulldozers used on stripping and in the quarry, and a rubber-tired Tournadozer used on quarry cleanup and road maintenance.

Layout of Port Dolomite stone plant and dock. Eight basic stone sizes are stockpiled and reclaimed on tunnel belt conveyors

Primary Crusher

The primary crusher, which was formerly in service at Thunder Bay, is a 60-in. Traylor gyratory unit, V-belt driven by a 450-hp. induction motor. It is enclosed and mounted on the quarry floor, and stone is dumped into it from two opposite sides via a recessed stone box. The crusher is served by a 70-ton overhead Cleveland crane and has new electrical controls and a new oil pressure lubricating system replacing the older splash oil system. The crusher product is discharged into a combined hopper-chute, from which a 54-in. x 25-ft. (P-1) belt conveyor followed by a 54-in. x 591-ft. (P-2) stacker belt conveyor which rises out of the quarry and delivers the stone to a large surge pile (10,000 tons live storage capacity). The latter conveyor, driven by two 250-hp. motors, is fitted with a Merrick Model E Weightometer for recording quarry production. The short conveyor, which in effect acts as a feeder, was installed to save wear (from impact) on the stacker conveyor.

Stone is reclaimed from the surge pile via a 120-ft. long reinforced concrete tunnel which is large enough to accommodate a 110-ton locomotive (the tunnel is 17 ft. 4 in. wide x 19½-ft. high). The tunnel walls are tapered, varying in thickness from 24 in. at the base to 45 in. at the top; the tunnel roof is 3 ft. thick and has gates spaced approximately on 12-ft. centers. The rail tracks (standard gauge) are embedded in the concrete floor. Stone is loaded by means of hydraulically operated gates and pivoted chutes. The cars are 35- and 50-cu. yd. units fitted with air-operated drop-side doors; they are loaded while moving through the tunnel. Two men handle the loading operation with dexterity, one operator filling the car, the second topping off the load. The cars are assembled in two 14-car trains, each hauled by a 1000-hp. American diesel-electric locomotive. Hauling 800 tons per train, each locomotive can make more than one round trip per hour over the 5-mi. single-track line. The track, built by the company, incorporates 100-lb. rails which were welded on the job into 1000 ft. long sections. Two steel bridges were constructed to negotiate two secondary road crossings.



Flowsheet of Cedarville operation, including quarry and stone plant. A 5-mile railway moves stone from quarry to plant

At Port Dolomite the stone is dumped from one side of a railroad trestle onto a 168-ft. long stockpile having a live storage capacity of 3000 tons. This material is reclaimed on an inclined 54-in. x 377-ft. (S-1) tunnel belt conveyor and carried to the secondary crusher building. The reclaiming tunnel is an arched reinforced concrete structure poured by the slip form method; it is identical in size and cross-section to the tunnels used for reclaiming the finished products. Tunnel dimensions are as follows: width (at base), 12 ft. 4 in.; heighth 11½ ft.; floor thickness, 3 ft.; and wall thickness, varying from 42 in. at base to 24 in. at highest point of roof. Stone is reclaimed through bifurcated chutes and quadrant gates spaced on 12-ft. centers. To record stone plant production, a Merrick Weightometer in installed on the S-1 conveyor. An R.C.A. electronic metal detector will be mounted on this conveyor shortly. Spillage is prevented by means of a 12 in. high steel skirt-board welded along both sides of the conveyor.

In the secondary crusher building the stone is scalped on a 6- x 14-ft. heavy duty Hewitt-Robins Vibrex single-deck screen, which is fitted with steel bars having 5¼-in. square openings. Oversize material is fed directly to an Allis-Chalmers 2460 gyratory crusher, with the throughs by-passing the crusher. This crusher is V-belt driven by a 250-hp. induction motor and has a 5-in. open side setting (1¼-in. throw); it is served by two 10-ton chain hoists. An interesting feature is that the secondary crusher is closed-circuited to a second 6- x 14-ft. scalping screen (also with 5¼-in. openings), the return being effected by inclined conveyors S-2 (36-in. x 99-ft.) and S-3 (36-in. x 83-ft.). Oversize material is returned for recrushing, while the throughs join with the first scalping screen throughs on a 48-in. x 274-ft. (S-4) belt conveyor and are elevated 100 ft. to the top of the screening building.

The screen house, a six story building, is divided into north and south halves, each containing three pairs of 6- x 14-ft. Hewitt-Robins double-deck screens. The four coarser sizes are produced in the south half (by Vibrex screens), and the finer sizes in the north half (by Elliptex screens).

In the south half the screen sizes and products are as follows: first pair, 3- and 2-in. sq. openings, respectively, producing 5 x 3 and 3 x 2 stone; second pair, 1½- and 1-in. sq. openings (perforated plate), respectively, producing 2 x 1½, and 1½ x 1 stone; and third pair, $\frac{7}{16}$-in. hexagonal openings (plate) and 8-mesh (Ton-Cap) openings, respectively. The latter screen pair is used for dewatering and scalping off the minus 8-mesh material; the top decks serve to relieve the load off the bottom decks, thereby effecting more efficient screening. The minus 1-in. product is returned to the north half of the screen house for further

Self-propelled, crawler-mounted wagon drill putting down a 10-ft. satellite hole. Note extremely rough bedrock surface

Rubber-tired, tractor-bulldozer cleaning up around one of the 8-cu. yd. electric shovels. The face is 45 ft. high

One of the electric blast hole rotary drill units for drilling 6¼-in. dia. blast holes. The primary crushing station and surge pile are in the background

Secondary drilling is handled by this self-propelled drilling rig; the operator controls the drilling from the cab suspended on a 40-ft. boom

A 6- x 14-ft. double-deck screen, showing 1 x ¾-in. stone coming off the top deck

sizing via inclined belt conveyors R-5 (36-in. x 139-ft.) and R-6 (36-in. x 128-ft.

In the north half the screen sizes are as follows: first pair, ¾- and ⅝-in. sq. openings (wire cloth), respectively; second pair, perforated plate with $\frac{9}{16}$-in. hexagonal openings (equivalent to ½-in. sq. openings) and ⅜-in. hexagonal openings, respectively; and third pair, 4-mesh (.187-sq. openings) and 8-mesh (Ton-Cap, with .087 x $\frac{7}{16}$-in. openings), respectively. Finished products include 1 x ¾, ¾ x ½, and ½ x 8 mesh stone. In this arrangement, products of two decks combine to make the ¾ x ½ material, and products of three decks combine to make the ½ x 8 mesh (rice). This practice is followed to effect efficient screening, since the extra decks act as relieving decks. Stone sand is produced in two 15-ft. dia. Link-Belt Rotoscoops, which are fed minus 8-mesh material from the bottom screen pairs in both halves of the building.

All screens are fitted with water sprays to insure thorough cleaning. Spray nozzles are used on the decks fitted with 8-mesh cloth, while all other decks have drilled pipes with deflectors.

Tertiary crushing is handled by an Allis-Chalmers 584 Hydrocone crusher and a 5½-ft. Symons standard cone crusher mounted in parallel. The former, V-belt driven by a 300-hp. motor, has a Hydroset mechanism for varying the crusher opening; generally it is set with a $\frac{7}{16}$-in. closed side setting (1½-in. throw). The cone crusher, direct-driven by a 200-hp. motor, has a ½-in. closed side setting (1½-in. throw). The operation is flexible so that any stone size larger than ½ in. can be fed by belt conveyor to the tertiary crushers. Both crushers dis-

ROLL CRUSHER PRODUCTION TIME DOUBLED...

using Stoody Semi-Automatic Wires

Roll wear encountered in crushing extremely hard blue granite rock to critical specifications was limiting production at Arizona Sand and Rock Company's portable plant, near Phoenix. Every hour of running time had to be matched with an hour down for maintenance of the rolls! Days just weren't long enough to produce tonnages required and still keep equipment in shape... at least not by ordinary methods.

To avert an impending aggregate bottle-neck, management turned to the new Stoody semi-automatic hard-facing process, set up as a routine repair technique. Time required for maintenance was immediately cut in half... and the hours gained each day were converted to a much needed second production shift!

Low spots on the pair of 40" x 22" rolls are nightly built up as necessary with Stoody 7/64" diameter Manganese. Corrugations are capped with Stoody 100. Both of these alloy materials are supplied in tubular wires for semi-automatic application. High deposition rates—7 to 15 pounds per hour—are several times faster than manual welding. Considerably less heat input is required than by other methods. Deposits are sound and free from porosity. No flux or flux dams block the weldor's view and stub end losses are eliminated.

By permanently installing the semi-automatic welder as part of the crushing equipment no time was lost preparing for nightly maintenance.

If you have maintenance problems on any of your heavy equipment, we'd suggest that you ask your Stoody dealer (check the "yellow pages") for new literature on STOODY ALLOY TUBULAR WIRES, or write direct.

STOODY COMPANY

11929 East Slauson Avenue
Whittier, California

Above: Belt conveyor scale mounted on 54-in. belt conveyor (P-1), 591 ft. centers, records quarry production

Right: Two 6- x 14-ft. scalping screens serve the 2460 gyratory secondary crusher. The crusher is closed-circuited with the screen on the left. Note large stone box

charge their products to the R-5 conveyor, and the material is returned for fine screening.

Stockpiling—Boat Loading

Stone sand and 5 x 3-in. fluxstone are delivered to stockpile by individual, stationary stacker conveyors measuring 24-in. x 141-ft. and 36-in. x 133-ft. in size, respectively. The six intermediate sizes are handled by travelling conveyors mounted on a 360-ft. long stocking bridge (formerly used at Thunder Bay), which extends from the rear of the screen house. These conveyors, which vary in length from 332 ft. to 516 ft., are arranged on the bridge in tiers three to a side; each in turn leads to a 57-ft. stacker unit, which can be boomed up and down in order to minimize the stone drop. In this system, 36-in. conveyors handle the two additional fluxstone sizes, 30-in. conveyors the 2 x 1½ and ½ x 8 mesh sizes, and 24-in. units the remaining sizes. Total stockpile live storage capacity is approximately 100,000 tons. Through use of the travelling stackers, the stockpiling operation is highly flexible.

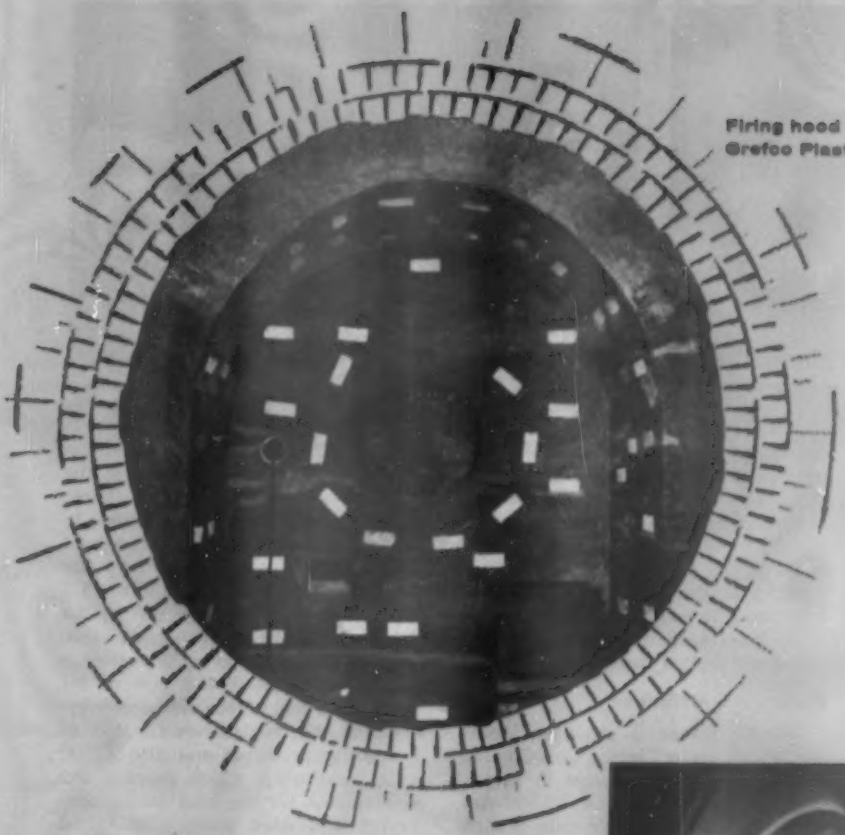
The reclaiming system incorporates a 590-ft. main tunnel leading to the causeway and two 580-ft. lateral tunnels paralleling the stocking bridge; the main tunnel serves the stone sand and 5 x 3 stone stockpiles and each lateral tunnel serves three stockpiles. Stone is reclaimed through bifurcate chutes and quadrant gates spaced on 12-ft. centers. Various sizes can be blended by simply varying the gate openings or the number of gates used.

Each lateral tunnel houses a 54-in. x 535-ft. belt conveyor (L-1 and L-2), while the main tunnel conveyor (L-3) is a 54-in. x 980-ft. unit. To prevent spillage, the L-3 conveyor is fitted with steel skirt boards along its entire length, while three rail-mounted chute cars (hearses) are used in conjunction with each lateral conveyor. The loading dock, which is connected to the mainland by a 350-ft. causeway, measures 117 ft. wide by 620 ft. long. It was constructed of interlocking sheet steel piling driven 68-ft. to bedrock to form a rectangular enclosure, which was then filled with stone brought in by self-unloader boat. The protected location enables boats to be loaded on the bay side of the dock, at the edge of the 26 ft. deep natural channel. Loading is handled by an Industrial Brownhoist travelling shuttle boat loader formerly used at the Thunder Bay operation. The loader, mounted on standard gauge rails spaced 60 ft. apart, can traverse the length of the dock, thus allowing the boat to be moored in a fixed position during the entire loading operation. Stone is delivered to it by a 54-in. x 546-ft. (L-4) conveyor; a Merrick Weightometer is installed on this unit to determine shipping weights. The loader incorporates conveyor L-5 (a 60-in. x 80-ft. unit) which leads to loading conveyor L-6 (a 60-in. x 68-ft. unit mounted on a goose-neck frame). The latter conveyor can be boomed up and down and shuttled back and forth to facilitate loading. Conveyor L-5 is hinged at the midpoint to allow L-6 to be raised and lowered. Boat loading capacity is 2800 t.p.h. Stone is shipped in both bulk carriers and self-unloading vessels.

Water Supply

Wash water is obtained from McKay Bay by two low pressure 12- x 14-in. Morris Type MH centrifugal pumps housed in a pumping station on the dock. These pumps, driven by

Primary crushing station, stacker belt conveyor, and primary surge pile are located at quarry, five miles from Port Dolomite



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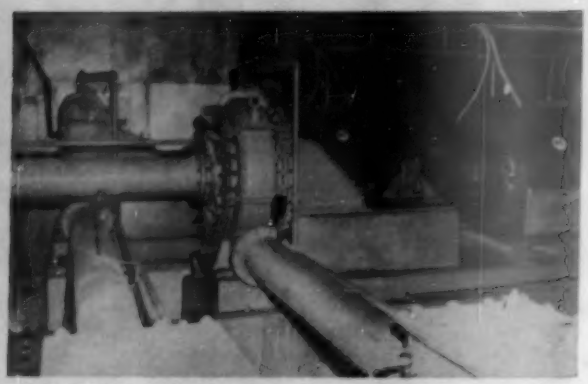
One of the 15-ft. dia. rotating classifier-dewaterer units which produces minus 8-mesh stone sand



Pair of 10-in. dredge pumps which transfer fines from washing operations to a settling pond. Drive motors are 350-hp. units

75-hp. motors, are operated either singly or in series; each has a capacity of 4500 g.p.m. The water is carried through a 24-in. pipe line to a sump located in the pump house adjacent to the screen building. A third centrifugal pump—a high pressure 8- x 10-in. Morris Type H unit, driven by a 300-hp. motor, delivers the water to the top of the screen house at 3000 g.p.m. (285 ft. head).

Fines formed during the washing operations are drained to a second sump in the pump house, and then pumped by two 10-in. Morris Type G dredge pumps through 3000 ft. long pipe lines to the settling pond. Each dredge pump has a capacity of 4500 g.p.m. and is driven by a 350-hp. wound rotor motor. Resistors placed in the circuit provide five motor (and pump) speeds for handling the variable amount of slurry to be moved. Both sumps are fitted with automatic high and low floatless (electrode-type) liquid level controls which activate 24-in. motorized valves. Through this system, make-up water from the clear water sump is automatically transferred to the slurry pump in order to maintain the proper consistency. Operation of the entire pumping system is controlled from the pump house. Priming of the dock pumps is done automatically (with a vacuum pump), while the three units in the pump house are primed manually.

Electrical Distribution

Electric power is purchased from the Edison Saulte Electric Co. of Saulte Ste. Marie and is brought in to the quarry and plant by a 69,000-volt transmission line. A 26-mile branch was constructed to tie in the plant with the main Saulte line. A 2500-kv.a. three-phase oil-cooled Allis-Chalmers transformer located at the quarry steps down the power to 4160 volts for use by the shovels, rotary drills, and the primary crusher and P2 motor drives. Power for operating the smaller units is supplied by a 225-kv.a. three-phase 4160/440 volt transformer. At Port Dolomite there is a 3750 kv.a. three-phase transformer which reduces the incoming power to 2400 volts. Three feeder centers and two substations in turn distribute the power throughout the plant. One center serves the pump house, secondary crusher, and the S-1 and S-4 conveyor motor drives; the second serves the tertiary crusher motors and a 1500-kv.a. transformer which supplies 440 volt current for the screens and screen house conveyors; and the third serves the L-1 to L-4 conveyor drives and also a 500 kv.a. transformer which supplies 480 volt current for the boat loader conveyors and dock pumps. Individual control and operating panels are located in each major building. As a safety measure, control panel switches can be locked out when repair work is underway. Each foreman and electrician uses individual padlocks. All transformers are delta-wye connected, and a continuous ground is provided for all buildings, conveyors, and sub-

(Continued on page 140)

Electrical control panel for screen house operation. Indicating lights and start-stop buttons are on the extreme right

Loading 3 x 2-in. fluxstone on 54-in. tunnel belt conveyor, (L2) 535 ft. centers. Note bifurcate chute and quadrant gate to load belt conveyor

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New Gaste plant at Rockmart, Ga. of Georgia Lightweight Aggregate Co.

General view of Somerset Crushed Stone, Inc., Bernardsville, N. J. showing construction for expansion of facilities

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Faster work, because a GM 2-cycle Diesel, with its responsive governor, efficient fuel injectors and power at every piston downstroke, gives you instant pickup in response to changing loads.

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No matter where your contracts take you, you'll find GM Diesel distributors ready to supply fast service and quick delivery of low-cost factory parts. Check your local distributor today for full details on dependable, low-cost Diesel power for your equipment, or write direct for more information.

PURCHASED 23 GM DIESELS SINCE 1947

This LeTourneau-Westinghouse Tournapull is part of an earth-moving fleet used by the Lone Star Steel Company of Lone Star, Texas. The Company, one of the largest producers of steel in the Southwest, has been a consistent user of General Motors 2-cycle Diesel engines in several different kinds of earth-moving, construction and mining equipment for better than seven years.

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DIESEL POWER

SAVING $170.00 A MONTH IN FUEL ALONE

United Construction Company cut fuel costs over 60% and reduced maintenance costs when they *switched* from gasoline to GM Diesel power on their Moretrench pumps. The GM Diesels worked 24 hours a day, 7 days a week—eliminated stops formerly required to pull and service spark plugs every three days and to replace them every three weeks.

13,000 HOURS—NO REPAIRS

General Contractor A. H. Famularo bought this GM Diesel-powered Northwest 25 Crane in April 1947. In 13,000 hours he never had an injector out, never touched the head or pan. He burns 16 gallons of low-cost Diesel fuel in 8 hours—specified GM Diesel power "because it was economical . . . and has proved to be reliable."

25% MORE WORK; FUEL COSTS ⅓ LESS

Killough Construction Company has *standardized* on GM Diesel power for their portable rock crushing plant in Kansas. The firm uses six GM Diesels to run a hammer mill, operate conveyors and screens, a primary crusher and two shovels. One shovel, converted from gasoline to GM Diesel power, now does 25% more work on one-third less fuel cost.

"WONDERFUL PERFORMER"

This GM Diesel-powered scraper hauled nine yards every four minutes on a recent job for the R. J. Boe Construction Company. Contractor Russell Boe likes the "wonderful acceleration and trouble-free performance GM Diesel power gives me." He says, "All you need to do is keep water, oil and clean fuel in that GM Diesel and you'll get a good day's work out of it."

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Stable Operation of Kilns With HEAT RECUPERATORS

By HUBERT WOODS*

IT IS GENERALLY RECOGNIZED that the best operating condition for rotary cement kilns is one which may simply be called a steady state. When this condition exists, maximum fuel efficiency may be obtained. Many factors are recognized which work against the maintenance of a steady state. Some of these are listed below.

1. Changes in composition or fineness of the raw mix
2. Intermittent return of flue dust
3. Changes in kiln draft
4. Poor regulation of kiln feed
5. Poor regulation of kiln speed
6. Poor regulation of fuel firing rate
7. Formation and breaking up of kiln rings

In modern cement plants, arrangements are provided to maintain adequate uniformity of raw mix composition and fineness. Flue dust is returned continuously and uniformly. Kiln draft is automatically controlled at a desired figure. Better apparatus for feeding the kilns can reduce variations in rate to less than plus- or minus 2 percent. Uniform kiln speed is produced by using motors which maintain their speed at a desired rate independent of changes in load or line voltage. Fuel firing can be done at a very constant rate using gas or oil, and with somewhat more difficulty using coal. Kiln rings present a real difficulty in maintaining a steady state, but in general give less trouble when other sources of irregular operation are minimized.

All this is well known; it is not so generally known that the modern kiln equipped with an efficient clinker heat recuperator has a built-in potentiality for unstable operation which needs to be recognized and guarded against. Fortunately, it is relatively easy to minimize trouble from this source, once it is understood.

The kiln, with its heat recuperator, is a system in which heat from the clinker is returned to the burning zone. In this respect, it is a "feedback" system, which is one in which energy is taken from a point late in the system and returned or fed back at an earlier point. An analogy may be found in the field of electronic amplifiers. Feeding some of the electrical output back to the input in a certain way may result in very unstable operation. In an extreme case, the operation may become so unstable that violent, continuous electrical oscillations are produced. In the electrical case, it is possible to alter the way in which feed-back is introduced so as to result in more stable operation than without feed-back, but unfortunately this is not possible in the case of the kiln with a recuperator. This will be made evident by detailed analysis of how heat recuperation affects stability of kiln operation.

Suppose that a kiln with recuperator has been in a steady state for a time, but that for any one of a number of reasons the temperature of heated air from the recuperator rises above its steady-state value. Upon entering the combustion zone, this hotter air will increase the flame temperature, with a consequent increase in heat transfer to the load. The hotter clinker, upon entering the recuperator, will result in still hotter combustion air, thus tending to magnify and perpetuate the condition which we assumed as a deviation from the steady state. In an analogous manner, one can trace the effect of an adventitious *reduction* in temperature of combustion air from the recuperator. Such a reduction will lower the flame temperature, the heat transfer, the clinker temperature, and finally will tend to make the combustion air temperature still lower.

Fortunately, although the direction of the effects is as described, they are not of such magnitude or duration as to cause serious trouble, except under certain circumstances which will now be discussed.

Varying Kiln Speed May Cause Trouble

It is common practice to synchronize the kiln feeder drive with the kiln, by mechanical or electrical means, so that the feed rate to the kiln depends upon kiln speed. Sometimes the control of clinker temperature in the hot zone is exercised through variation of kiln speed and, due to the synchronization just mentioned, of feed rate. It is obvious that reducing the kiln speed will cause the charge in the hot zone to remain there longer, and thus to be brought to a higher temperature. This action is abetted by the lesser quantity of cooler feed entering the hot zone per unit time, due to the lower kiln speed. It is also obvious that increasing the kiln speed will decrease the time clinker remains in the hot zone, thus lowering its temperature. This cooling action is abetted by the larger quantity of relatively cooler feed entering the hot zone.

Although the method of kiln control just described is a simple one and has been widely used, it is nevertheless one which greatly accentuates any tendency toward instability in kilns provided with efficient heat recuperators. In fact, unstable operation is an almost certain consequence. Consider, as before, a kiln with recuperator operating in a relatively stable condition, and assume that the hot zone temperature is observed to be too high. The operator increases kiln speed. Let us now analyze the consequences of this adjustment. Almost immediately the amount of clinker entering the recuperator will increase. Shortly, the effects of more and hotter clinker in the recuperator will become manifest in an increase in temperature of the combustion air, thus leading to higher flame temperature and still higher hot zone temperature. The operator may soon decide that he has not increased kiln speed sufficiently, and may make a second adjustment thus further increasing the recuperated heat. Whether he does this or not, the fact remains that the initial increase in kiln speed has tended to increase the hot zone temperature, a result just opposite to that intended. Furthermore, the first increase in hot zone temperature consequent upon the adjustment has induced a still further increase.

Naturally this cyclical increase in hot zone temperature cannot go on ad infinitum. It is eventually terminated by the larger burden of relatively cooler feed coming into the hot zone, and the termination may take place rather quickly. When it does, the operator observes that the hot zone temperature is falling, or perhaps has already fallen to normal or lower. He then slows the kiln. The effects produced by this adjustment are just the reverse of those previously described. There is an immediate reduction in the amount

(Continued on page 160)

*Director of Research, Portland Cement Association.

Shock and vibration are absorbed by this Gates Vulco Rope Drive on the ball mill in a New York rock crushing plant, saving over $600 a year in maintenance costs. Management gives credit to the resiliency of the Gates Vulco Ropes and to their concave sides for the many years of dependable service they have given.

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When a Gates V-belt bends around the sheave, the *precisely-engineered* concave sides (Fig. 1) fill out and become straight. Thus the sides of the belt make full, uniform contact with the pulley (Fig 1-A).

Naturally, uniform contact distributes the wear *evenly.* And *even* wear means *longer* wear.

Longer wear saves not only on replacement costs; it also saves the cost of down-time... keeps equipment producing.

Simple test proves value of concave sides

Take a straight-sided V-belt (Fig. 2) and bend it. Feel the sidewalls of the belt bulge out as the belt bends. You see immediately that the bulging sides prevent uniform contact with the pulley (Fig. 2-A). Uneven contact causes faster wear...increases your drive replacement costs.

Let the cost-saving longer life of Gates Vulco Ropes contribute to *your* profits. Specify Gates Vulco Ropes—the V-belts with concave sides (U.S. Patent 1813698). The Gates Rubber Co., Denver, Colorado—*World's Largest Maker of V-belts.*

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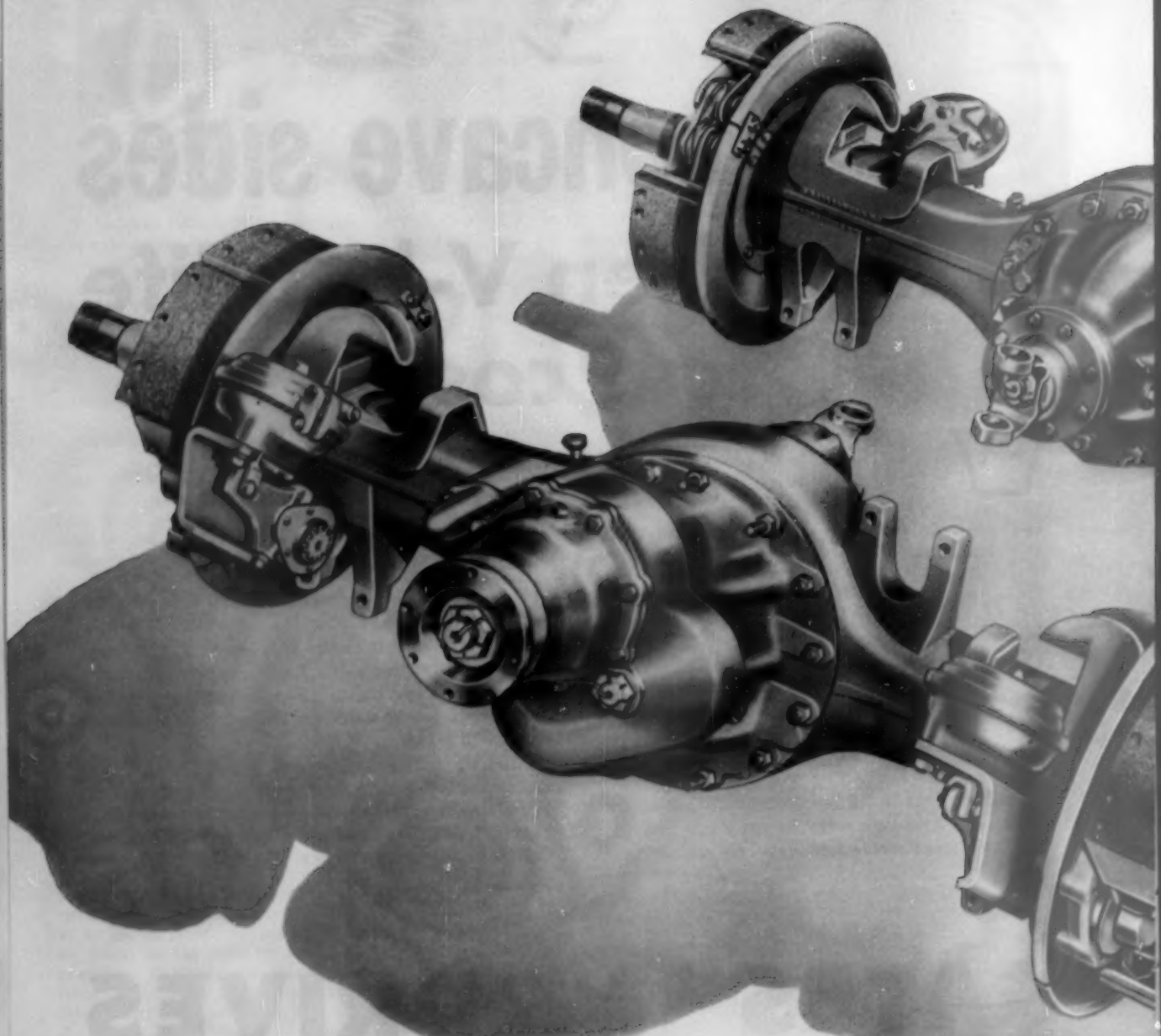

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Each year highway hauling achieves more spectacular importance. *Now* TDA presents a new lightweight tandem specially designed to answer the needs of over-the-road trucking. It is offered with a choice of either Timken-Detroit axle connecting groups, or brackets to accept other approved chassis hook-up parts. You get all these additional advantages with the Timken lightweight tandem:

Many proven standard parts and assemblies, gears, pinions, differentials, brakes used in Timken-Detroit *single axles* are incorporated in the new lightweight tandem. This assures operators fast, economical service with minimum down time.

A true inter-axle differential always under drivers' control is an important feature of the Timken-Detroit lightweight highway tandem.

Big, dependable hypoid gears rotate in conventional manner, carry load on normal drive side of teeth for increased gear and bearing life.

Torture-tested TDA axle shafts are upset forged and heat treated to insure top tensile strength.

Rugged hot-forged housings—pound for pound—are the strongest and most rigid built.

Less unsprung weight means lower impact and shock loads, for longer truck and trailer life.

This new highway tandem insures new payload profits, faster, easier service and operating economies for highway truckers everywhere. For complete information contact your nearest vehicle dealer or branch.

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ACOUSTIC Control of Mill Feed for Pulverized Coal

• Standard Telephones and Cables, Ltd., London, England develop mill feed control system

PROCESSING OF PULVERIZED FUEL for modern furnaces and boilers employs a continuous feed type of ball mill. In the past, regulation of coal fed to the mill could be achieved, with reasonable accuracy, only by a skilled operator relying almost entirely on a highly developed sense of hearing.

For some time it was thought possible to emulate this work by acoustic and electrical means, and Standard Telephones and Cables Ltd., of London, England, recently installed in Battersea power station, London, a mill feed control system, based on "an acoustic assessment of the significant parts of the overall noise frequency spectrum."

To be effective, any method of automatic feed control must be based on the actual, and not estimated, level of raw coal within the mill. Since it is not always practical to make an assessment of this quantity based on the amount of coal being fed into the mill and its output, the acoustic mill feed controller has been designed to determine the actual coal level in the mill from the noise level of the cascading coal and balls in contact with each other and with the walls of the drum. As with the human ear, this calls for extremely fine distinctions in noise level taken at a reference point in the immediate vicinity of the drum.

For this purpose, a microphone, adequately protected against dust and dirt, is placed immediately beneath the drum. It is connected by cable to the main controller unit which is set up at any desired distance from the tube mill. The output stage of the controller unit comprises a series of pads for lining-up purposes, an amplifier and a high-pass filter, the function of the latter being to segregate the significant high-frequency noises emanating mostly from inside the drum, from the low-frequency noises associated chiefly with the external gearing and drive of the mill itself.

The output from the amplifier-filter stage of the controller is used to actuate a sensitive relay adjusted to operate according to fluctuations in noise above a set figure, corresponding to the optimum amount of coal in the drum. This relay serves to provide, through suitable heat coils and relay trains, a means of altering the speed of the feed motor; or alternatively for manual control purposes, of actuating a gauge to indicate the contents of the tube mill.

During installation of the acoustic mill feed controller, it is necessary to determine the particular noise frequency emanating from within the mill which affords the greatest discrimination between the full and empty conditions; it is also necessary to know the noise level at this frequency corresponding to the optimum amount of coal within the drum. A complete analysis of the noise spectrum over a range of mill loadings, using particular grades of fuel, may be made with an objective noise meter used in conjunction with an octave filter, such as manufactured by Standard Telephones.

Considering the circuit principles, the accompanying diagram shows how the microphone output is fed via an attenuator to a band-pass filter and amplifier. The amplifier output actuates the master relay controlling the feed motor and alarm circuits. It may also be applied to a noise level indicator in the form of a 6-in. flush-mounting micro-ammeter used for monitoring purposes, for manual control, and for routine testing of the valves and circuits.

The master relay is set to operate at a predetermined mill loading; the decision of the master relay as to whether the mill requires more or less material is conveyed, via time delay contacts, to a slave relay whose contacts are rated at 5 amp. at 500 volts d-c. This slave relay, which can be arranged to make, break, or changeover, is connected in the feed motor circuit in such a manner that one position of the relay contacts results in fast running and the other position in slow running. The time delay circuit ensures that the feed motor is not operated by any short-duration noises produced by the mill, and it also reduces hunting to a minimum.

The calibrating oscillator enables the gain of the amplifier to be checked and maintained at a predetermined value; a suitable arrangement of lamps give a failure alarm if for any reason the apparatus develops a fault. In addition, a visible indication of the rate of feed corresponding with conditions within the mill—full, low, high and empty feed rates—is provided by corresponding engraving on the noise level indicator meter.

The specification of this apparatus shows that control is to within 1 decibel of the optimum noise level indicating the correct amount of coal or other material within the tube mill. Minimum optimum noise level is given as 70 phons or 22,000 American noise units. Power requirements of the controller unit are 230 volts plus or minus 2 percent; alternating current supply at 50 volts plus or minus 2 percent c./s. The dimensions of this unit are 11 x 13 x 12 in., and it contains four valves.

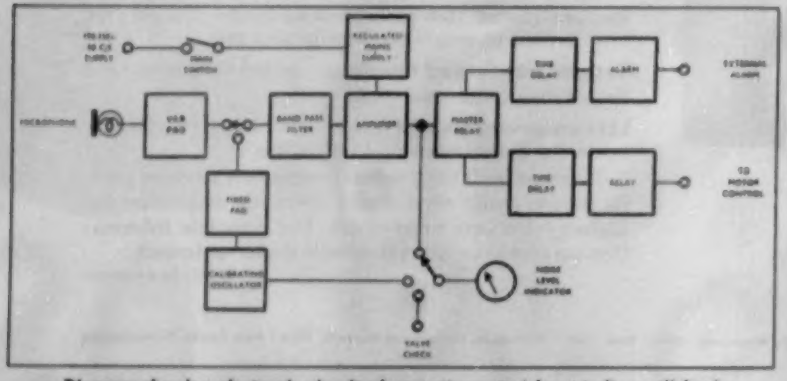

Diagram showing electronic circuit of acoustic control for grinding mill feed

GENERATOR WITH BASE RATING OF 60,000-KVA HELPS CREATE OPERATING CONDITIONS FOR LARGE MOTOR RESEARCH IN NEW G-E LAB.

In New G-E Development Laboratory Giant Motors Perform Just as in Service

One of the difficult problems design engineers face is predicting accurately how a giant motor will perform under operating conditions. General Electric has come up with an answer to this problem.

INCREDIBLY ACCURATE TEST CONDITIONS are made possible by the brand new G-E test laboratory pictured above. Heart of the test room is a synchronous generator with a base rating of 60,000-kva driven by a variable speed d-c motor to provide test current of variable frequency. A motor-generator set to supply the d-c current, exciter sets and elaborate switchgear make it possible to simulate test conditions far more severe than are encountered in the field.

DATA GAINED FROM TESTING today's motors and generators will be directly applied to the design and development of tomorrow's machines. Product development like this is an integral part of General Electric's continuing program to provide you with dependable, compact, efficient electric equipment.

Take advantage of this progressive engineering research and bring your large motor and generator problems to General Electric. For more information on G-E motors and generators call the nearest General Electric Apparatus Sales Office. General Electric Company, Schenectady 5, N. Y. 770-41

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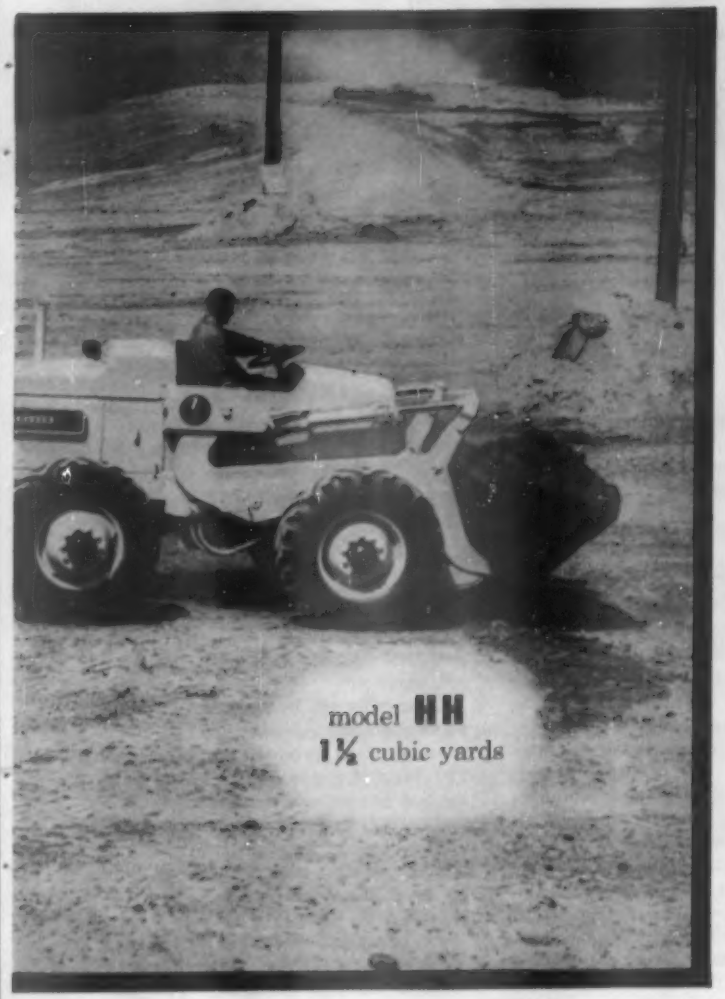

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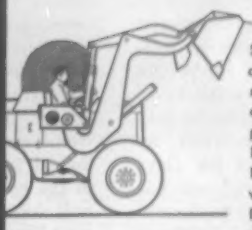
Tremendous pry-out force is obtained by using the breakout pads on the ground as a fulcrum for leverage. The load forces opposing the pry-out action are thus transferred to the ground through the pads instead of to the axle, wheels and hydraulic system of the machine.

40° BREAK-OUT at Ground Level

You can get HEAPED BUCKET LOADS and you get them FASTER and EASIER WITH THIS NEW BUCKET ACTION. Most important of all — you KEEP BIGGER PAYLOADS — because the bucket can be tipped back a full 40 degrees at ground level before it is raised, eliminating spillage.



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Illinois Geological Survey Celebrates Fiftieth Anniversary

By HUBERT C. PERSONS

MORE THAN 300 VISITORS including heads of geological surveys of 14 states, met at Urbana, Ill., Oct. 12 and 13 to celebrate the fiftieth anniversary of the Illinois Geological Survey. Spectacular growth in the production of non-metallic minerals and exciting future developments in all industrial minerals were predicted by speakers.

Thurlow G. Esington, chief counsel, Illinois Coal Operators' Association, Chicago, presided at the opening session on Oct. 11 in the auditorium of Gregory Hall on the University of Illinois campus. Morris M. Leighton, who was Chief of the Illinois State Geological Survey from 1923 to 1954, spoke on "The Survey's Response to the Changing Pattern of the Past Fifty Years." Dr. Leighton declared that the work of the Survey is dedicated to a better future for the people of Illinois. The beginning of the study of clay minerology in Illinois he said was a red letter day. This study, he said, has created a market for clays previously deemed "useless," and has been of great service in soil mechanics and foundation work. Dr. Leighton paid high tribute to what he called "the great stone industry" and emphasized the importance of ground water geology.

The Tasks Ahead

Dr. J. R. Van Pelt, president of the Montana School of Mines and director of the Montana Bureau of Mines and Geology at Butte was the speaker at the anniversary luncheon. He declared that the Illinois Geological Survey has been a power for economic progress and sketched the rapid development in research techniques and equipment affecting the science of geology. Dr. Van Pelt listed five urgent tasks ahead of the Geologic Survey. These are, he said, discovery of new mineral deposits, utilization of lower grades of minerals, reworking of old deposits, water supply and its allocation, and the disposal of industrial wastes.

Frank W. DeWolf, professor of geology, emeritus, University of Illinois, who was chief of the Survey from 1909 to 1923, presided at the afternoon session. G. H. Cady, senior geologist and head, emeritus, coal division of the Survey, was co-chairman. Speakers in a symposium on coal, petroleum and industrial minerals were: B. R. Gebhart, vice-president, Freeman Coal Mining Corp., Chicago; Vincent J. Nolan, independent oil producer, Mt. Vernon, Ill., and Norman J. Dunbeck, vice-president for industrial minerals, International Minerals and Chemical Corp., Chicago.

Future Outlook

Mr. Dunbeck's address was entitled: "The future Outlook for Industrial Minerals and the Role of Research in Their Future." The speaker paid high tribute to the work of the Illinois Geological Survey.

Referring to developments in specific minerals, Mr. Dunbeck said: "Everyone in the minerals industry knows of the major contributions which have been made by state geological survey staffs. I know of some of the particular jobs done by the Illinois staff. I know of many limestone, sand, gravel and clay deposits which were opened almost solely due to their efforts. I know that their work on the chemistry of rock wool raw materials has been as important as the work on the deposits. Work done by the Survey on clay minerology has been particularly outstanding and has received international recognition. Research, largely by state survey staffs and other state and government agencies, has been almost solely responsible for creating as prosaic but profitable a market as that for agricultural limestone which is over 19,000,000 tons per year.

"A point of real importance that is frequently not appreciated," Mr. Dunbeck said, "is that a Survey staff can save much money for industry by knowing where not to look for minerals. This requires real knowledge of the resources of the state and such knowledge is had and shared by the Illinois staff.

Mr. Dunbeck quoted statistics to show the rapid growth of the non-metallic minerals. "From 1900 to 1950," he said, "production of all minerals increased by 370 percent, but the non-metallics increased by 704 percent. The growth in non-metallics was 190 percent of the growth of all minerals. That covered 50 years. But, more recently, from 1940 to 1950, the growth in non-metallics was 226 percent that of the growth of all minerals.

"The growth in some minerals has been spectacular," the speaker said. "For example, production of barite which has been a mineral of many uses for many years has increased 1300 percent in 30 years. In only 7 years of production perlite increased by 2100 percent. In only 4 years, production of lithium minerals increased 224 percent, as common a mineral as magnesite increased 77 percent, scrap mica 128 percent and ordinary quartz 130 percent.

"Summing up, in the past 50 years, population has increased 100 percent, gross national product has increased 237 percent while non-metallics production has increased 700 percent. We are talking about minerals which have already had spectacular growth. I confidently predict that the growth will be even more spectacular in the future."

Mr. Dunbeck referred to feldspar as an example of the availability of a mineral through research. "For 100 years," he said, "pure crystal feldspar had been hand cobbed from the rich central core of pegmatites. By the mid-1940's, the supply was getting short and users felt concern. In 1945, our company successfully pioneered feldspar flotation. The ore is called alaskite and is an intergrowth of quartz and feldspar. It was worthless by older methods. By flotation, it produces a cleaner and more uniform spar than had previously been available. The important point here is that a good large pegmatite vein for hand cobbing might produce a few hundred thousand tons while just one of our alaskite dikes contains about 60,000,000 tons. In a brief period, by research, feldspar changed from a shortage material to one whose supply is assured for hundreds of years."

As an example of the application of new devices in research and testing, Mr. Dunbeck described the use of a Geiger counter at a feldspar mill in Maine, to determine the potash content of the feldspar. He asserted that research can accelerate the growth of

(Continued on page 152)

NEW SUPER RAYNILE CONVEYOR BELT 400% STRONGER

Provides the economical answer to transporting crushed stone and other bulk materials over long distances and up steep slopes.

This remarkable new Hewitt-Robins conveyor belt reinforced with the revolutionary synthetic fabric, Super Raynile, makes possible an entirely new concept in single-section conveyor application. It solves difficult materials handling problems where topography and other conditions require the use of a long single-length conveyor.

Already in service, Super Raynile has the highest operating tension of any conventional carcass belt. Because of its tremendous tensile strength, 400% greater than conventional cotton reinforced belts, a single conveyor section *5¾ miles long* can be built over level terrain to carry material at 400 TPH using only a 6-ply Super Raynile belt 30 inches wide. This same belt can also lift material from ground level to a height of 830 feet.

The new Hewitt-Robins Super Raynile conveyor belt is highly flexible and pliable despite its great strength. Its cost is less than steel-reinforced belts and Super Raynile can easily be spliced in the field more quickly, more economically and without the specialized equipment required to splice steel-reinforced belts.

Super Raynile belt is available in a wide range of specifications . . . widths up to 72" — thickness up to 15 plies.

Learn more about this new long-length, long-life conveyor belt. Contact your local Hewitt-Robins Industrial Supply Distributor (see Classified Phone Book), or write direct to "Super Raynile Belt", Hewitt-Robins Incorporated, Stamford, Connecticut.

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A report from a Canadian gypsum Company

on their 6 new high-speed haulers and tractors

Wide bowl opening on Rear-Dump provides easy target for dragline loading. Model shown has 19-ton capacity . . . newest "C's" carry 22 tons.

High-speed mining tools by LeTourneau-Westinghouse

Smooth, streamlined, unobstructed body readily sheds sticky material.

Haul to overburden dump is made at speeds up to 35 mph.

REAR-DUMPS

9 ton, 138 hp
22 ton, 208 hp
35 ton, 293 hp
50 ton, 420 hp

BOTTOM-DUMPS

18 yard, 208 hp

SELF-PROPELLED SCRAPERS

7 yard, 138 hp
16 yard, 208 hp
23 yard, 293 hp

Rear-Dumps, Bottom-Dumps and Scrapers all interchangeable behind same prime-mover.

RUBBER-TIRED TRACTORS

Now available—208 hp

A leading Canadian gypsum Company must take all their gypsum from under a 30 to 75 ft. layer of clay-pocketed rock. This sticky overburden is loaded by draglines, and hauled half a mile to waste dumps. Six LeTourneau-Westinghouse units are used to speed hauling and dozing on the big job. Here is what they report about these machines.

Advantages of Tournapulls

Two original Tournapull Rear-Dumps were purchased to haul overburden following years of satisfactory experience with bottom-dump Tournatrailers. These two 18-ton rear-dumps performed so well, the company recently bought 2 more.

1 Company officials give, as chief advantage, the ability of the Tournapull Rear-Dumps to go through mud which stops all other haulers. Tournapulls even work out of deep mud-holes and off dumps so soft a man cannot walk through them. This exceptional mud-ability is due partly to traction of big single 21.00 x 25 low-pressure tires . . . partly to power steer which works independently of footing through geared kingpin . . . partly to exclusive patented differential which *automatically* transfers power from slipping wheel to wheel on better footing.

2 Tournapull Rear-Dumps haul faster than ordinary trucks on the rough roads. Rig's big tires cushion the bumps, let Tournapulls often reach top speeds.

3 Tournapull Rear-Dumps work faster in narrow quarters. They turn around normally in a space 24 ft. wide . . . with bowl raised (which shortens wheelbase) they turn around non-stop in a space only 21 ft. wide. This mobility

A Subsidiary of Westinghouse Air Brake Company

speeds haul on narrow roads, reduces time for spotting turn at both shovel and dump.

4 Tournapull Rear-Dumps need practically no clean-up aid on the dump. With front-wheel drive, they back safely to edge of bank. Bowl swings behind and below rear wheels . . . loads fall free over the edge. Company officials say only one clean-up is now needed *per day*.

Advantages of Tournatractors

Company owns two of these big 4-wheel tractors. Each is equipped with dozer blade, does such work as leveling tailings pile, cleaning overburden dump, maintaining stockpiles, plowing snow.

1 Canadian gypsum officials say Tournatractors chief advantage is their ability to go anywhere . . . over rough ground, pavement, railroad tracks. Tires do no damage to surface, or surface to tires. Mobility pays off especially on such scattered jobs as removing newly-shot rock from rail tracks. Fast removal is important here, since gypsum is carried to crushers and screening plant by railroad ore cars.

2 Speed often enables each Tournatractor to do as much work as 2 crawler-tractors. Tournatractors doze faster, 3 to 8 mph, compared to crawlers' 1 to 4 mph . . . they back up faster, 3 to 8 mph vs. crawlers' 1 to 3 mph . . . they move faster between jobs, 19 mph vs. 4 to 8 mph for track machines.

3 Tournatractors reduce maintenance needs. Because 4 rubber-tired wheels do work of the 500 to 600 parts of a track assembly, there are less places to grease and oil, fewer parts to wear out.

Ask us to show you first-hand how these advantages can pay off for you.

Tournapull, Tournatractor—Trademark Reg. U.S. Pat. Off. TR-750-M

Tournatractor low-pressure tires provide plenty of flotation and traction in loose steep-grade footing. Multi-disc 4-wheel air brakes give ample margin of safety.

Dozing rock, Tournatractor moves up to 2½ cubic yards per pass.

LeTourneau-Westinghouse Company

PEORIA, ILLINOIS

Two views of stockpiling belt conveyor, with plant shown in background, to the left

South Africa's First Phosphate Plant

• Phosphate Development Corporation, financed by the Union of South Africa, will produce concentrates from apatite bearing ore. Initial capacity will be 80,000 tons of concentrates annually

By P. HOLZ

OPEN CAST MINING OF PHOSPHATE ROCK was recently started in the Union of South Africa by a state-financed company, known as the Phosphate Development Corporation. From indigenous deposits of apatite bearing ore, phosphate concentrates will utilmately be converted into superphosphates.

Situated in the North-Eastern Transvaal, only a stone's throw from the world famous Kruger National Park, the phosphate deposit has been estimated to meet all of South Africa's requirements for the next 150 years.

Initially 80,000 tons of concentrates will be produced annually; later enough will be produced to make the Union entirely independent of foreign imports. Local resources consist of huge deposits of pyroxenite, containing apatite from which phosphate concentrates are extracted by means of flotation. The apatite appears in a prominent hill rising from the flat bushveld. It has been estimated that the phosphate contained in the total ore body is worth about $900,000,000.

The total ore body to be mined, including the vast reserves of pyroxenite averages 7 to 10 percent apatite content. The recovered concentrates contain 33 percent P_2O_5, the same grade as the rock phosphates at present imported; pure apatite is 40 percent P_2O_5; recovery should be over 80 percent.

For many years to come mining will be done by open cast methods. The Loolekop hill will be mined in successive cuts, starting from the top, by large scale, non-selective methods.

Height of the quarry face is at present being kept to 25 ft., due to the difficulty of drilling deeper blastholes in the ore body, which is extremely friable, jointed at and near the surface.

Drilling tests with wagon drills, using 1¼-in. round extension steel and tungsten-carbide bits up to 3-in. gauge, were unsuccessful and 25-ft. blastholes are now drilled by hand-held jackhammers using 1-in. hexagonal tungsten-carbide tipped steel.

(Continued on page 86)

View of the quarry shortly after it was opened up

with Firestone
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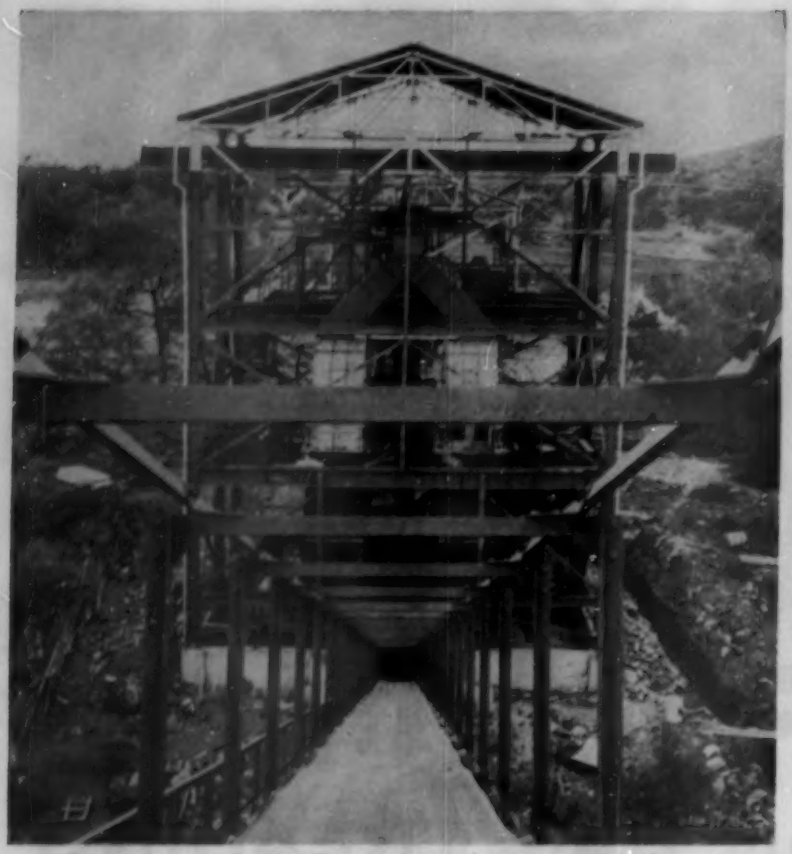


Construction view of main belt conveyor with plant structure in background

The ore, loaded by diesel shovels into 15-ton Euclid quarry trucks, is transported about ¾ mile and dumped into bunkers. From the bunkers ore is processed through a series of crushers and stored in a large crushed ore bunker. A 4- x 5-ft. primary jaw crusher is large enough to handle any big pieces of ore, reducing to a minimum the secondary blasting required in the quarry. Mined ore is only delivered to the plant during 8-hr. shifts for five working days. The crushed ore bunker, however, feeds the milling and concentration plant continuously, day and night, every day of the year.

Foskor, (abbreviated name of the Phosphate Development Corporation) will not make consumer products at the beginning. Its product is processed by African Explosives and Chemical Industries, largest chemical plant in the Southern Hemisphere, and by the African Metals Corp. The former produces superphosphate; the latter will ultimately produce phosphorus.

Crushing and Screening

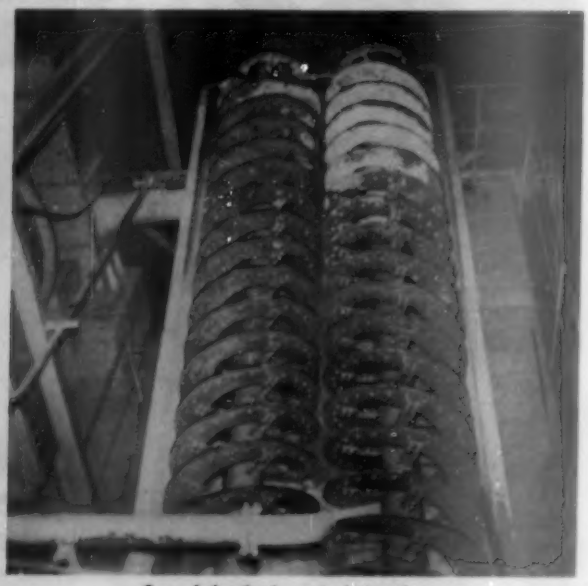
The plant operates as follows: The run of mine ore is dumped into specially designed bunkers, lined with smooth steel plates, which are so constructed that hanging up of material will not be experienced. From this bin, material is fed into the jaw crusher by means of a steel apron conveyor. The apron conveyor and jaw crusher have been designed to take large lumps of ore. The crusher plant designed by the German Gutehoffnungshutte, incorporates several innovations. The jaw crusher reduces the rock to minus 12-in. size.

A belt conveyor carries the jaw crusher product to two impact mills, with rotors having a diameter of 63 in. and a width of 50 in. The main advantage of this type of mill is its large reduction ratio; down to minus 1-in. The crushed material goes to double-deck vibrating screens with a screening surface of 52 sq. ft. Oversize material is fed into the tertiary crushers. Minus 1-in. material is fed into a 1700-ton crushed ore bin.

The whole crusher section has been designed to handle a throughput of 260 t.p.h., sufficient to crush the daily mine output in 6½ hr.

The phosphate extraction plant has been designed to allow for variations

Looking down battery of flotation cells



One of the duplex spiral classifiers

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See your Chevrolet dealer for details. . . . Chevrolet Division of General Motors, Detroit 2, Michigan.

NEW CHEVROLET Task-Force TRUCKS

CHEVROLET

Illuminated control board in the crushing section of the plant

in ore composition. Magnetite is separated first, then the other minerals by means of froth flotation machines.

Material from the fine ore bin is fed by belt conveyor, passing a sampler, into a rod mill, to obtain the proper size of material for the wet magnetic separation. The mill, which has been designed to handle about 36 t.p.h. of minus 1-in. crushed material, is driven through gears by a 330 kw. motor.

Magnetite is removed by means of two immersion belt magnetic separators, with 36-in. wide belts and magnetic cores 24-in. wide. The core is laminated with the laminations arranged so that they are alternatively polarized in the same direction, in order to obtain a rotation in the particles of magnetite adhering to the belt. This assists in the removal of entrapped non-magnetic material, as it tends to free it from the belt. The magnetic product will be dewatered in a single spiral classifier and then fed by means of a screw conveyor to a small bin, whence it will be transported by means of lorries to a temporary dump.

The non-magnetic material has to be thickened before flotation. The purpose of this is twofold: first, to thicken the pulp to a density suitable for conditioning prior to froth flotation; and second, to act as a storage tank for the pulp and thus to iron out any fluctuations resulting from uneven feed to the rod-mill.

After the pulp has passed the primary flotation cell, it is re-ground in a ball mill to minus 40 mesh for final extraction in the secondary flotation stage. The complete plant operation is shown on the flow sheet.

A notable feature of the plant is that all machines will be remote controlled from two mimic diagram panels with illuminated dials.

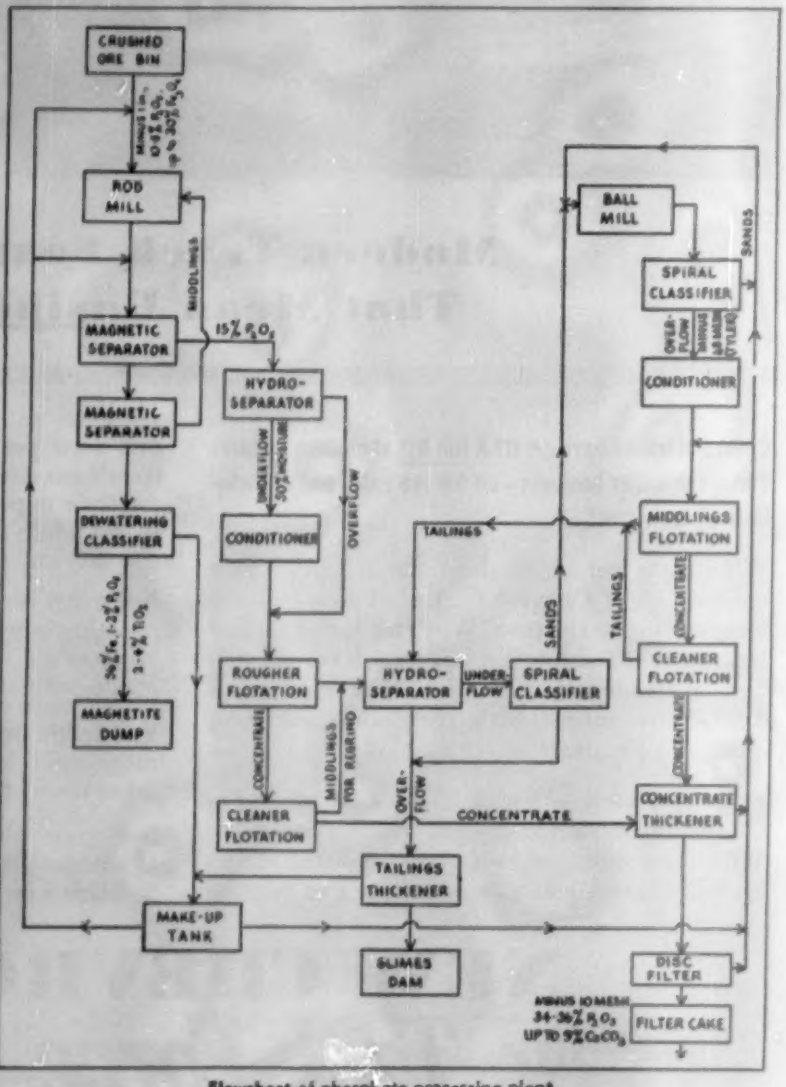
Froth Flotation

The rejection of the calcite and vermiculite constituents in the pulp to obtain the phosphate concentrate is a matter of close control of flotation reagent quantities. The apatite can be floated, to the practical exclusion of the other minerals by closely regulating to a minimum the addition of the collecting agent, without the use of depressants. As this method restricts recovery, a combination of low collector quantity and optimum depressant quantity has been adopted in the flow sheet. In addition, soda ash and sodium silicate is used, for their water-softening and dispersing qualities.

The flow sheet is flexible, however, in that alkalis can be added in the primary grinding mill or for that matter, the first conditioner, while still permitting conditioning at high or low pulp density, with reagents adjusted to give maximum grade of concentrate in primary flotation. Loss of apatite in primary flotation, due to coarse size and/or low collector additions will be largely made up in a second flotation circuit, using reground, reconditioned and deslimed rougher flotation tailing as feed. The important step of using sizing as the method of making final plant tailing from combined flotation tailings has been developed from a careful laboratory study of flotation tailings obtained from open-circuit ground pilot plant flotation feed.

Although there are a number of large-scale froth flotation plants for the production of sulphides in South Africa, the Foskor plant will have the only large operating non-metallic flotation concentrator. Phosphate concentrates will be dried to a 3 percent moisture content prior to shipping. Iron ore by-products will initially be stockpiled. Because of the availability of large deposits of cheap iron ore, magnetite is at the moment not being used for the manufacture of steel in

(Continued on page 154)



Flowsheet of phosphate processing plant

All 3 Kerford Quarries maintain top production with DEISTER Screens

Insert: View of screening operation showing the two Deister 3-deck Model UHS Screens operating in tandem. All told, Kerford has purchased 9 Deister Screens, including a Model SL Ag-Lime Screen, and a Model F Horizontal Screen since the original installation at Atchison.

Kerford Quarries began operation in 1886 at Atchison, Kansas, opened up a second operation at Amazonia, Missouri, in 1948, and a third at Ashland, Nebraska, in 1952. In all three of these high-producing quarries, Kerford depends upon Deister Machine Company Vibrating Screens for accurate sizing, trouble-free performance, top production.

The newest plant, at Ashland, is equipped with two 5' x 14' 3-deck Deister Screens operating in tandem, and one single-deck 4' x 12' Deister. This is a limestone operation producing up to 1500 tons per day of concrete rock, mineral aggregates, base coarse material and agricultural limestone.

Says George Harper, Plant Superintendent: "We have not touched a bearing on the Deister Screens since they began operating in April 1952. I have never seen screens perform any better or require less care. We check the oil periodically and have had no trouble. Whenever my recommendation is asked on new equipment, it will be for Deister 100%."

Deister Type UHS Vibrating Screens provide high capacity and peak performance through the *exclusive opposed elliptical throw principle.* They feature a Life-Time Unitized Vibrating Mechanism, with two-bearing construction and full oil bath operation. Also, exclusively Deister are the adjustable screen panels, enabling the operator to increase or decrease screening angle at the feed or discharge end *independently* of the balance of the screening area. Write Deister today for Bulletin No. 54.

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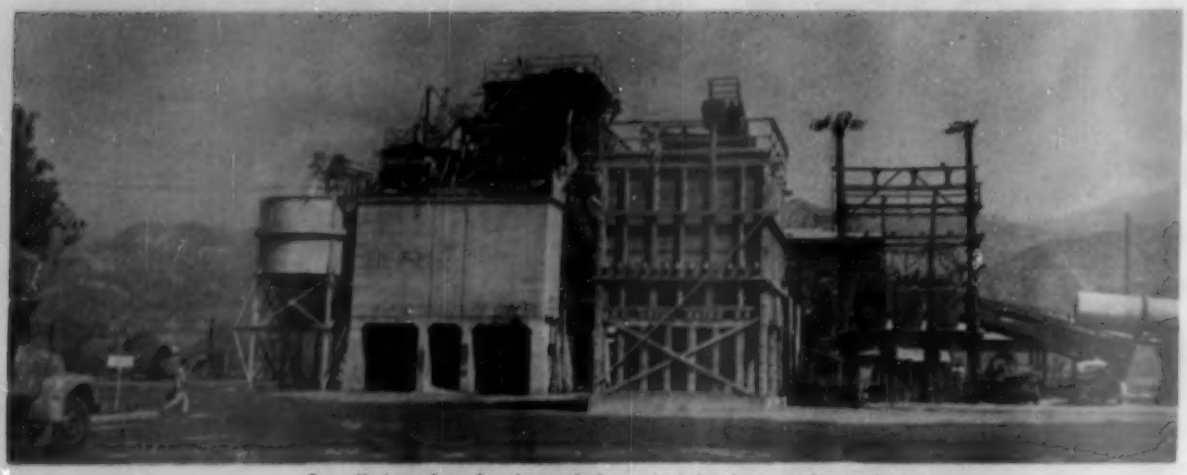

Overall view of sand and gravel plant which has been modernized

Re-equip and Modernize Old Plant

• Livingston Rock & Gravel Co., convert Sunland, Calif., plant from wood to steel construction and install modern excavating, crushing and screening equipment

By WALTER B. LENHART

IN 1953, LIVINGSTON ROCK & GRAVEL CO., INC., Long Beach, Calif., took over the sand and gravel operations of the City Rock Co.,* Sunland, Calif. Since the plant was taken over, all wood construction has been changed to steel. A new 4¼-ft. standard Symons cone crusher was installed in the re-crushing section. A 24-in. Cottrell (Georgia Iron Works) Whirlcone has been installed to recover fine sands from the overflow of the drags. This unit is recovering 6 to 7 t.p.h. of needed fine material. An Osgood crane with a McCaffery bucket is also one of the newer additions. In addition to the new crane, a Lorain and an Oliver crane are available for reclaiming from ground stored material.

Sunland is a northern suburb of Los Angeles and is in a section of the country that might be called the "foothills." The gravel pit is on the flanks of the Tugunga river, a stream dry most of the year, but during the Los Angeles rainy season is apt to be like many other so-called "rivers" in the area, dry most of the year but full of raging water from rim to rim during the wet season. Controlling these flood waters is one of the jobs of the U. S. Corps of Engineers and many check-dams, some quite large, dot the foothill areas. To protect these dams and the drainage systems to and from them is a never ending project that calls for large tonnages of so-called "cobbles."

*This company was formerly owned and operated by Pete J. Akmadzich. "Pete," as he is known to many in the industry still retains an asphalt plant with adjoining offices.

"Cobble" Plant

This material, which is plus 6-in. with some of the larger boulders up to 30-in., is used to protect earthworks from erosion. As several plants in southern Cailfornia produce the material, the new cobble plant at Sunland is an excellent example of the technique used. This plant produces a minimum of 700 t.p.h., which is trucked to place of use.

Preparing the cobbles is quite simple. A 3½-cu. yd. Lima shovel in the pit loads to a fleet of two Euclid bottom-dump trucks that haul a pay-load

Jim Le Monaco, superintendent

A 3½-cu. yd. shovel loading 30-ton capacity haulage unit in the pit

New Conveyor Belt Combines Increased Strength With Extra Flexibility

Rugged Mainliner - Conveyking conveyor belt is engineered for tough jobs involving high tensions, high lifts and long center distances. It's ideal for conveying aggregates, coal and ores. It's steel-like in strength, practically stretchless, yet extremely flexible and troughs easily.

Mainliner belts have about twice the strength of ordinary cotton duck belts of the same gauge. They resist the destructive action of water, oil, weather and age. Why? Because these belts are made of multiple plies of strong duck with Nylon woven across the width and a new-process, high-strength cotton woven lengthwise, with skim coats between plies. They are available in any lengths, with any number of plies, in widths up to 72".

Like other heavy duty belts, these Mainliner Conveyking belts are custom made to meet particular requirements of individual jobs. They can be made with a cover tensile strength of 3500 to 4000 pounds average and a friction pull of 20 to 24 pounds average. They can also be made with a cover tensile strength of 2500 to 3000 pounds and a friction pull of 16 to 19 pounds. They are also available in oil-resistant Neoprene. All are mildew inhibited throughout. A breaker strip can be included in top cover, if specified.

We also manufacture a complete line of industrial rubber products: hose, belting, packing and moulded rubber of every construction for every need. *Through your Quaker and Quaker Pioneer distributor* our research and engineering services are always available to help you solve any industrial rubber problem. *Write for free folder and name of distributor.*

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Minus 6-in. gravel and sand is sent by belt conveyor to a bin from which it is trucked to washing and screening plant

Vibrating grizzly which separates out the plus 6-in. cobbles which are used to line banks of rivers to prevent flood erosion

of 30 tons. The haul is about 1000 ft. over easy grades. The Euclids unload to a hopper under which is a Pioneer apron feeder that delivers material to a Symons vibrating grizzly. The plus rock falls to a pit below the grizzly where a 2½-cu. yd. Link-Belt Speeder loads the man-sized rip-rap to trucks. The minus fraction is moved by belt conveyor to a bin, and three pit trucks haul the fines to the washing and screening plant which is about 250 ft. from the cobble plant.

One feature of the pit operation is that water is sprayed onto the bank ahead of the shovel so as to reduce dusting. The pit being on a "dry" river often means that water is below ground levels. At this operation, a pit 8 ft. below pit floor levels fills with water to within a foot of the surface so a small 3-in. gas-driven pump is used to pump the water which is sprayed on the area ahead of the shovel. The bank to be excavated is sprayed one day and worked the next.

Crushing, Washing, Screening

The washing and screening plant prepares both washed gravel and unwashed crushed gravel. These materials are kept separate, the split being made ahead of the 12-K, Gates primary crusher via a grizzly which makes a minus 2½-in. material that goes to the wet screening plant, and the plus rock goes to the Gates gyratory crusher. Two parallel inclined belts deliver each product to its section of the plant. Over these belts is a truck hopper so that material can be hauled back to the grizzly over the hopper and the material re-processed if desired. In addition to the crushers

(Continued on page 154)

Primary gyratory crusher which reduces material to minus 2½-in. that goes to the wet screening plant

Bucket elevators are used to handle the intermediate sizes. In the foreground is a 4¼-ft. standard cone crusher

SLAG...

and Symons® Cone Crushers

• SYMONS CONE CRUSHERS . . . *the machines that revolutionized crusher practice* . . . have long proved their efficiency, dependability and economy in the profitable reduction of ores and minerals the world over. In the case of SLAG, it is significant that a great percentage of the world's production passes through Symons Cone Crushers. These dependable machines are selected for this tough crushing job because of their ability to produce with large capacity a maximum of desired product size at low cost per ton. In addition they are best designed to cope with free iron which might be present in a slag crushing operation.

©1955, Nordberg Mfg. Co. C655

• *One of three Symons Cone Crushers used for crushing blast furnace slag at the new Park Hills plant of Cambria Slag Company, Johnstown, Pa. This plant is a division of Standard Slag Company, one of the world's largest crushed slag producers and users of more than 65 Symons Cone Crushers of various sizes in their vast operations.*

NORDBERG MFG. CO., Milwaukee, Wisconsin

SYMONS . . . A REGISTERED NORDBERG TRADEMARK KNOWN THROUGHOUT THE WORLD

SYMONS GYRATORY CRUSHERS

NORDBERG GRINDING MILLS

SYMONS VIBRATING SCREENS

SYMONS VIBRATING GRIZZLIES

NORDBERG ENGINES . . . 10 to over 12,000 H.P.

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MACHINERY FOR PROCESSING ORES and INDUSTRIAL MINERALS

NEW YORK • SAN FRANCISCO • DULUTH • WASHINGTON
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Three sizes of washed gravel and one size of sand are stockpiled by belt conveyors that finger out over a reclaiming tunnel

• Peter Kiewit Sons' Co., Palmdale, Calif. uses basic portable plant equipment in a permanent set-up to obtain a high rate of sand and gravel production. Operate both dry and wet sections

By WALTER B. LENHART

Semi-Portable Does A Permanent Job

NEAR PALMDALE, CALIF., is the sand and gravel plant of Peter Kiewit Sons' Co. This plant is of interest to rock products producers as it is relatively new, has processed almost two million tons of material, and is one of the first to use motorized head pulleys for practically all the conveyors. At the time of inspection there were ten Yuba Schrock motorized head pulleys in use on 20, 24, and 30-in. belt conveyors.

The plant, now owned and operated by the Peter Kiewit Sons' Co., was originally built by another rock products producer-contractor, but early in 1955, was taken over by its present owners who made extensive changes in some phases of the operation. The former operators processed about 1,500,000 tons in some 14 months of operation. Practically all of the finished material is going to the Edwards Air Base at Muroc Field nearby. Palmdale is on the edge of the desert northeast of Los Angeles some 75 miles. Air base activities and the establishment of two airplane factories nearby, plus a surge of residential building, has caused land in the area to skyrocket.

Water is scarce in the area although Palmdale was originally built around the irrigation theme with water from wells. The Peter Kiewit Sons Co. purchase and pump water some two miles although two wells on company property are being developed. Provisions have been made to store and reclaim water from a settling pond near the plant.

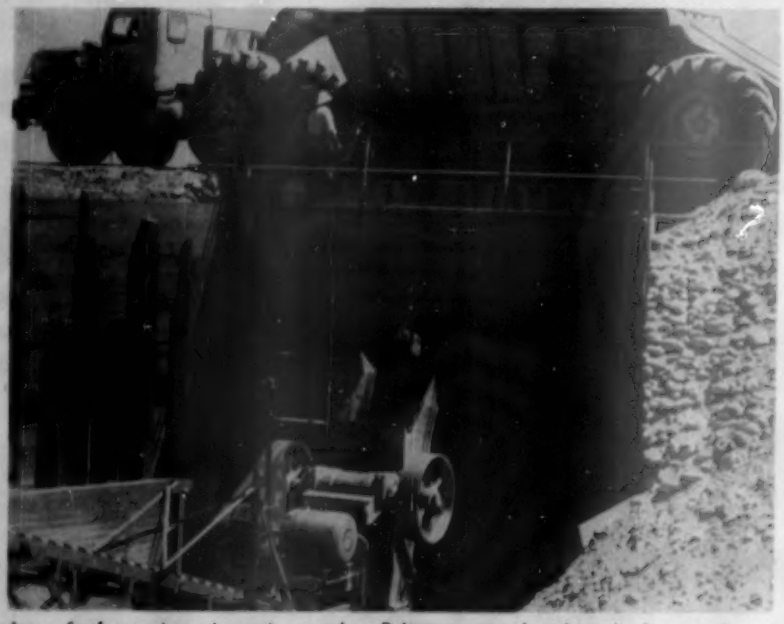
Pit Operations

Loading in the pit is done with a 2½-cu. yd. No. 80 Northwest shovel that loads three Euclid bottom dump units. Stripping is not a problem at the Palmdale operation, and the deposit ranges from 20 to 40 ft. thick. The material appears to be quite clean, nevertheless a rotary scrubber is one of the primary operations in the wet plant that follows the dry crushing operations. Sand is recovered by a pair of twin Eagle 36-in. sand screws.

Screening and Crushing

The plant is of the semi-portable type, but is permanently mounted. Equipment is principally Diamond Iron Works, Inc. manufacture. The 24- x 36-in. primary crusher is preceded by an apron feeder. It is followed by a secondary 10- x 36-in. jaw crusher and a set of 40- x 22-in. rolls for final reduction. The first screen, a 2½-deck, 4- x 12-ft. unit, is operated dry. The second screen, a three-deck 5- x 14-ft. unit is operated wet. The third is a single-deck, 4- x 12-ft. unit, also operated wet. All are Diamond screens. Three sizes of washed gravel and one size of sand are stockpiled by belt conveyors that finger out over a reclaiming tunnel. These conveyors all use the Yuba Schrock motorized head pulleys.

Of the two 30-in. belt conveyors, one is out of the primary section and is 85 ft. centers, and the other extends



Apron feeder serving primary jaw crusher. Belt conveyor takes throughs from crusher to dry section of plant. Note large bottom-dump haulage units, above

Welder is shown welding a "wear-sharp" repointer to the shank of a dipper tooth using the Amsco MF and flux.

HARDFACE WITH THE AMSCO® MF

for manual flexibility . . . plus machine speed and accuracy

The Amsco MF combines the visibility and craftsmanship of hand welding with the automatic advantages of machine work. Speed of hardfacing increases because the Amsco MF uses small-diameter electrode and high-current densities which allow the operator to maintain a high deposit rate. The electrode feed is continuous—and automatically regulated—to maintain a constant arc. Thus, the machine automatically *compensates* for operator movement or an irregular welding surface.

Cost of deposited metal is less! The Amsco MF uses coiled, bare mild steel electrode. It feeds through the flux hopper (the cone). There it is magnetically coated with your choice of manganese steel build-up or hardfacing alloy which is carried in the flux. You coat your electrode as you weld at considerable savings in deposit cost.

The machine is portable. It plugs into any standard welding unit, and requires no special setup. See a demonstration of the Amsco MF's speed, quality of weld and uniform deposit. Try it yourself and discover how easy it is to operate. Your Amsco Distributor is ready to show it to you now. Welding products are distributed in Canada by Canadian Liquid Air Co., Ltd.

make your Amsco Distributor HARDFACING HEADQUARTERS

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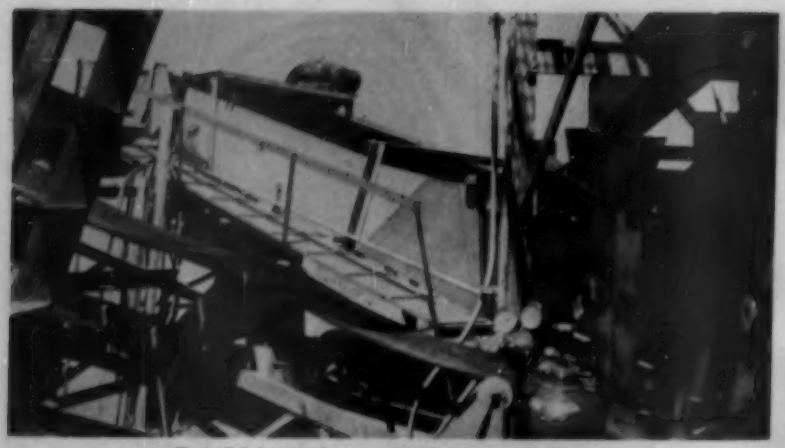
Chicago Heights, Ill.



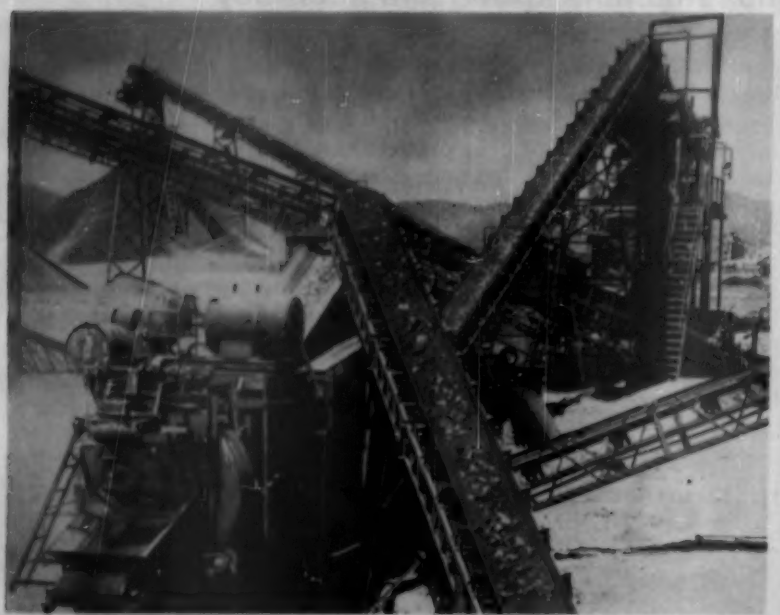
Twin 36-in. sand screws for the recovery of sand

from the preliminary dry plant to the wet plant, 100 ft. centers. Both belt conveyors are inclined about 14 deg., and are heavily loaded most of the time. The plant has a capacity of 300 t.p.h. A 24-in. belt conveyor, 150-ft. centers, is the longest, and is driven by a 15-hp. motor. The motors on the two 30-in. belt conveyors are both 25-hp. Goodall belts are used for the most part, and they ride on "greased for life" (sealed) Diamond idlers. The important inclined conveyors are provided with brakes which is a correctional feature with belt reversals in mind. To date all the motorized head pulleys have functioned efficiently.

The Yuba Schrock motorized head pulley, which has the motor mounted inside the head pulley, does not require external gears and sprockets, chains, etc. Other advantages claimed for the pulleys include a saving in space and weight, and they may be operated under wet and dry, in gritty or dusty conditions. An internal ring gear is a part of the head pulley assembly and the motor has a driving gear affixed to the motor shaft. The speed of the belt conveyor (or r.p.m. of the head pulley) must first be accurately established although gear changes can be made if necessary to increase or decrease the peripheral speed of the head pulley. The load on the belt in tons per hour, and total tons on the belt for its length, its inclination, etc., must all be taken into consideration so that gear sizes would not be used that would be seriously overloaded. They are in use at other operations from ½-hp. to 125-hp. The ends of the head pulleys are closed, but lubrication plugs are provided in the ends. Inspection holes are in the face of the drum. One reason for the success of this installation is that it was a completely engineered job; the correct size pulleys were selected for the tonnages intended to be handled.

The sand conveyor has a short stub conveyor at the end. The stub conveyor can be swung around laterally. This permits drainage time and more storage. The reclaiming conveyor operates in a corrugated steel tunnel and is served by six bin gates. This belt conveyor, which is a Conveyor Co. unit, driven by a Crocker Wheeler motor, delivers to three steel Noble load-out bins and all material is trucked to place of use. Over the three bins is a Cedarapids screen. Electric power is purchased.

Tom Paul is district manager with offices in Arcadia, Calif. Harry Okert is local superintendent and Lorrain Husman is foreman.



Dry section of the plant, to the left, and wet-operated section, to the right. Belt conveyor in foreground is from primary crusher. Note portable crushing and screening plant equipment incorporated in semi-permanent plant set-up

Mineral Sands Development in Ceylon

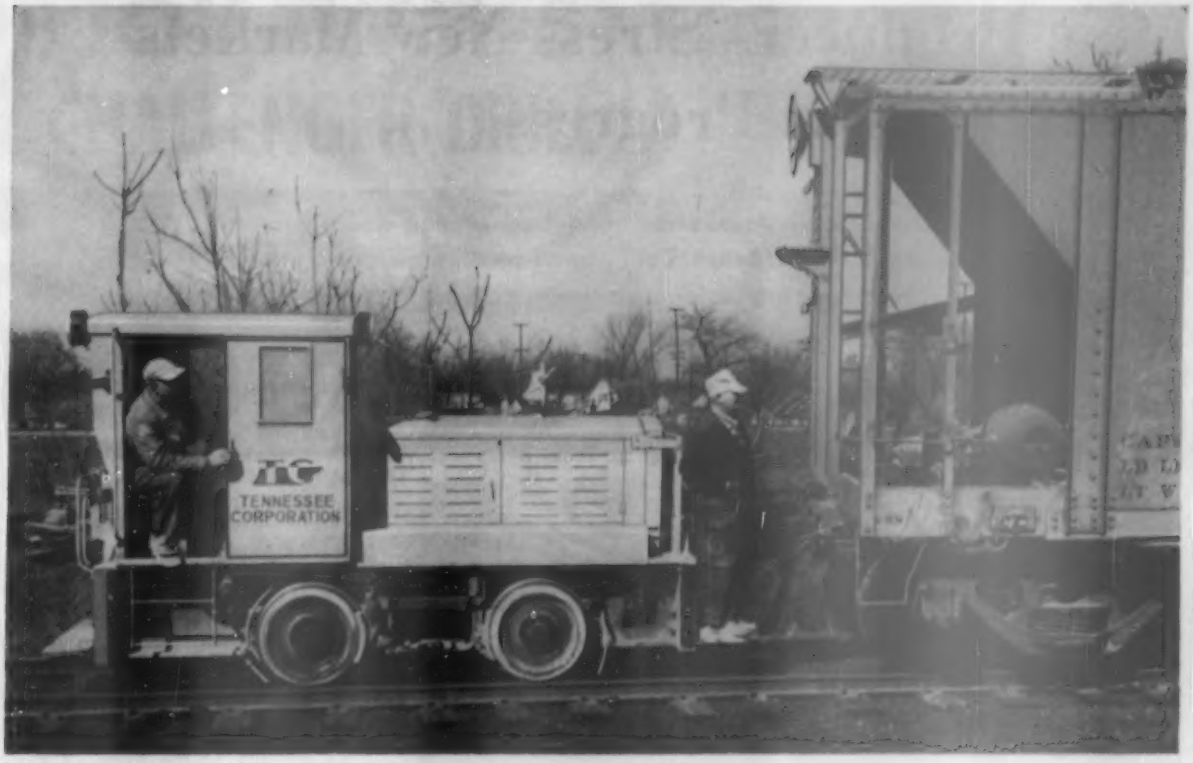
THE CEYLON GOVERNMENT recently invited bids for the development of a mineral sands deposit at Pulmoddai beach on the east coast of Ceylon. The deposit is said to contain approximately 4,000,000 tons of heavy mineral sands of the following composition: 72-75 percent ilmenite; 10-12 percent rutile; and 6-8 percent zircon.

Two proposals were made by the Ceylon government for the extraction of the minerals. Under the first proposal, the concessionaire would pay a royalty per ton for removal of the mineral sand for refining outside of the country. The second proposal called for the creation of a limited liability company in Ceylon to refine the sands there. This would require joint participation of Ceylonese and foreign capital.

A foreign firm entering Ceylon on the basis of the second proposal would be guaranteed free entry into and subsequent repatriation of capital and new profits. The government would also furnish limited port facilities, assist in recruiting labor, provide general services in the field of public health, housing, all-weather road facilities, etc.

Penn-Dixie Expands

PENN-DIXIE CEMENT CORP., New York, N. Y., is expanding its cement plant at West Des Moines, Iowa, at a cost of $4,500,000. When the program is completed by August, 1956, cement production will have been increased from 1,368,000 bbl. to 2,340,000 bbl. annually. A third kiln is being added, measuring 375 ft. long, and dust collectors are being installed in the stacks of the new and existing kilns.



10-Ton Plymouth Diesel Torqomotive . . .

"Powerful Pusher with a Small Appetite"

at Tennessee Corporation, New Albany, Indiana

"Fuel economy is one of the best features of our Plymouth Model DGT Torqomotive," says S. H. Peden, Superintendent at Tennessee Corporation's New Albany fertilizer plant. "Our figures show the Plymouth operates 30 actual hours every week. In the past 31 months, fuel consumption has averaged 900 gallons per year. That's less than six-tenths of a gallon per hour, and certainly a meager diet for so powerful a pusher!

"The Torqomotive Drive contributes further to our savings in time and costs. The hydraulic torque converter eliminates shifting of gears under heavy loads of raw material and finished fertilizer. Steady power for smooth starts and stops and the end of coupling shocks are other benefits."

There's a moral for you in Mr. Peden's story, because there's a Plymouth Locomotive designed to give you top efficiency, economy and easy operation. Models from 3 to 70 tons. Gasoline or Diesel, mechanical or Torqomotive Drive.* Get full details and specifications in free illustrated catalog by writing: PLYMOUTH LOCOMOTIVE WORKS, Division of THE FATE-ROOT-HEATH COMPANY, Dept. A-5, Plymouth, Ohio.

PLYMOUTH® TORQOMOTIVES

*TORQOMOTIVE DRIVE: Plymouth Transmission Coupled to a Hydraulic Torque-Converter

ALSO BUILDERS OF F-R-H CERAMIC MACHINERY

Lime Producers Stress New Markets and Technical Progress

• National Lime Association annual convention and operating meeting at Pebble Beach, Calif. draws an all-time record attendance. Field trips are major attraction

NATIONAL LIME ASSOCIATION'S combined fifty-third annual convention and operating meeting, held October 19-21 at Del Monte Lodge, Pebble Beach, Calif., set an all-time record for attendance. More than 200 were registered for the first meeting of the association ever held west of the Mississippi River.

The annual convention and operating sessions were combined for 1955 because of the great travel distance involved, and the registration indicated that there was practically the same representation of executives and operating men that would have attended separate meetings in the East. Administrative, sales and operating subjects comprised the program to hold the attention of both general executives and production men.

Field Trip

One of the highlights was a full-day tour of the Kaiser Aluminum and Chemical Corp. lime plant and quarry at Natividad, Calif., and Kaiser's Moss Landing, Calif., magnesia and refractory plants. Transportation and luncheon were provided through courtesy of Kaiser Aluminum and Chemical Corp.

The Natividad plant is one of the most modern rotary kiln plants in the United States for the calcining of dolomite and its quarry operations atop a nearby mountain also held considerable interest. A special feature of the plant is use of the heavy media separation process as the final stage of a three-phase stone improvement operation, to float out silica impurities from the stone. This is the only application of heavy media separation in the lime industry.

The men most responsible for the successful convention arrangements were D. M. Kerr, Salinas, Calif., left, convention program chairman, and Kennedy Ellsworth, Los Angeles, Calif., chairman of the Operating Division

Belt conveyors deliver to the plant from a jaw crusher on the lowest working bench of the quarry. Enroute, waste material is screened out to a waste pile followed by washing through a scrubber to remove waste fines from the stone. Then follows the heavy media step in processing, rewashing and stockpiling.

Cleaned stone is put through a crushing and screening plant where special products such as roofing rock are screened out. Bulk of the stone is feed for three rotary kilns which each require 500 tons of raw dolomite per day. One kiln normally produces deadburned dolomite and the other two calcined dolomite for shipment to chemical plants and for use in making magnesium metal. Calcined dolomite is also trucked to Moss Landing.

Sea water from Monterey Bay provides one-half of the magnesia raw material needed for the Moss Landing plant. It also contains necessary chemicals to release the other half of the magnesia in the calcined dolomite shipped from Natividad. Large hydrotreater tanks, a reactor tank, thickeners and filters are involved in the process of producing a thick, pure magnesia paste. The filter cake is burned through two long rotary kilns. Various additives are required in producing periclase for refractory manufacture and for other products. Following cooling, the kiln products are crushed, screened and stored.

Products include magnesium hydroxide (filter cake), numerous grades of magnesias, deadburned magnesite and periclase.

The trip concluded with a visit to the nearby refractory brick plant. Here, periclase and chrome ore are crushed and screened, proportioned, mixed and fed to presses which shape refractory brick. A tunnel dryer is used to produce chemically bonded brick, some are encased with metal and others are heated to 2800 deg. F. to produce burned brick. Sacked material is also produced. Shipments are made in bulk or on pallets, by truck, rail or ocean vessels for use in steel, cement and glass plants.

Details on operation of the heavy media plant at Natividad were published in ROCK PRODUCTS, February, 1953, p. 89.

(Continued on page 100)

The brothers, Rolf and Sverre Markussen, of Franzefoss Bruk A/S, Sandvika, Norway, with **Robert S. Boynton,** center

JOY TWM-5 CHALLENGER DRILL

the BIG DRILL that has EVERYTHING

80° DRILLING RANGE

The Joy TWM-5 Challenger will drill at any angle between vertical and 10° above horizontal, making it applicable to almost any range of drilling required.

EXTREME MOBILITY

The TWM-5 is self-propelled on either rubber tires or crawler treads. It is driven on each side by a reversible piston type air motor, can turn in its own length, and can move into and out of most "tight" spots.

REMOTE CONTROL

All functions of operation, both drilling and moving, are controlled from the operator's station on the frame, directly over the left front wheel. Three hydraulic jacks provide stability while drilling.

TM-500 DRILL

The drilling machine on the TWM-5 is the JOY TM-500, a 5¼" piston drill, which has proved itself in quarry, construction, and mining work as the first and still the leader in the big drill field. The TM-500 is mounted on an extra sturdy mast which is raised and lowered hydraulically.

ADDITIONAL FEATURES

Optional features available on the TWM-5 are a cab, designed for the best in operator comfort and protection, and a dust collection system.

Check today on the Joy TWM-5 for your drilling operation. Whether you drill vertical holes or toe holes, it will fit your program and give added rock tonnages from the day it first goes to work. Write for complete information today to *Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.* In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

Joy TWM-5 drilling deep holes (50' to 100') in granite in a southeastern quarry.

Write for FREE Bulletin 19-27

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JOY

CONSTRUCTION EQUIPMENT MANUFACTURERS FOR OVER HALF A CENTURY

Conard M. Kelley, *recently appointed highway engineer, N.L.A.*

Heading up the program committee were Kennedy Ellsworth, U. S. Lime Products Corp., Los Angeles, Calif., Operating Division chairman; and D. M. Kerr, general superintendent, Salinas Area Plants, Kaiser Aluminum and Chemical Corp. who was program chairman. Messrs. Ellsworth and Kerr each presided for one of the two general convention sessions and Mr. Ellsworth extended the official welcome.

H. R. Brookman, U. S. Lime Products Corp., Los Angeles, Calif.; Ralph S. Locke, Diamond Springs Lime Co., Diamond Springs, Calif.; and Carroll Stephens, U. S. Lime Products Corp., served on the program committee.

Advantage was taken of the unrivalled facilities at the Lodge for entertainment, and everyone seemed to be carrying a camera to photograph the unequalled scenery everywhere about them. A golf tournament was held for the members, St. Regis Paper Co. was host to an evening reception, and a Spanish Fiesta and annual banquet completed the entertainment. Sightseeing featured the ladies' entertainment while the convention was in session.

President's Report

Amos B. Miner, National Gypsum Co., Buffalo, N. Y., president of the National Lime Association, presented a brief report of progress before the opening session. Mr. Miner first expressed his thanks and appreciation to the Kaiser organization for its hospitality and for arranging the trip made by the group through the Kaiser Aluminum and Chemical Corp. plants.

He attributed much of the progress of the association to the fact that member companies have more and more become friends and been willing to interchange ideas freely. Research and market development have played an important part, he said, and efforts must not be lessened during periods of a sellers' market. Rather, the industry must recognize economic cycles and continually prepare for the future.

About one-third of N.L.A. funds are being spent on market development, said Mr. Miner, and the technical committee has been greatly strengthened. Currently, the association has its highest budget and its highest income. He considers the addition of highway engineer Conard M. Kelley to the staff and the accelerated emphasis on promotion of lime for soil stabilization an important forward move. Hundreds of thousands of tons of lime are the potential for this use, offering a large income potential for all kinds of lime in his opinion.

General Manager's Report

In his annual report on N.L.A. activities, general manager Robert S. Boynton mentioned that this combined fifty-third annual convention and operating meeting had the largest attendance in history with 208 registered.

Mr. Boynton pointed out that there are now 65 companies with 108 plants in the United States producing lime for the open market. This contrasts with 400-500 plants in the 1920's and some 1000 plants when the association was founded 53 years ago. However, more tonnage of lime is now produced than ever before.

Mr. Boynton said that the association had filed a brief with tax officials to change the end use method of determining percentage depletion to basing it on the grade of limestone. This interpretation, if adopted, would eliminate much litigation with the revenue department.

During the past 12 months, the association has been more active than ever before in preparing and disseminating literature. Among publications put out are "Road Stabilization," the fourth edition of "Principles of Sewage Treatment," "Lime Plant Safety" and the new map showing the location of U. S. lime plants. There has been great stress on the distribution of literature and facts on lime.

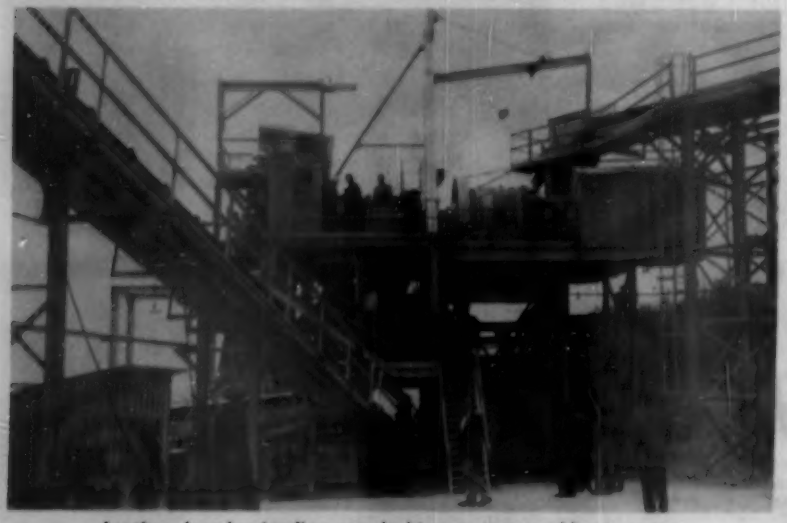
Work is progressing on a publication, "Neutralization in Trade Waste Treatment" and one by Prof. Walter Voss on "Masonry and Mortar."

Lime stabilization research at the University of Texas has developed the cohesio-meter, a new tool for testing the tensile strength of lime-soil mixtures. Results of this research work are to be presented before the Highway Research Board this winter. Research on trade wastes at Rutgers University has resulted in the presentation of two papers and an article is to be published in *Petroleum Refiner* based on N.L.A. research.

A paper on the elasticity of mortars, showing that increased lime content results in greater elasticity and bond strength of mortars, will be presented at the A.S.T.M. convention in June, 1956. As a result of association work, lime has been upgraded in the code of the Pacific Coast Building Officials Conference. A paper on mortar has been presented before a meeting of the Mason Contractors Association.

Commenting on the lime-soil stabilization program, Mr. Boynton said that highway engineer Conard M. Kelley, had called on 13 state highway departments during his first month of employment with the association. He was enthusiastic about the potentialities of lime for this use and suggested that lime producers may have to expand productive capacity as this market develops.

Mr. Kelley was introduced. He expressed confidence in the future for lime in soil stabilization and promised



Another view showing lime men *looking at stone scrubber in action*

ONE OF MANY NEW CRAWLER AND RUBBER-TIRED MODELS introduced by Link-Belt Speeder this past year. It's the full 1-yard capacity LS-98 — the most advanced design in modern shovel-cranes. New Link-Belt Speeder features allow owners to boost output, cut costs and increase their profit margins.

UP TO 25% MORE OUTPUT — Speed-o-Matic power hydraulic controls cut fatigue. No lag, jerk or strain.

AHEAD ON ½-YARD JOBS — It's the new LS-58, fastest, most powerful rig in its class, with "big-rig" features.

UP TO 99 NET HP FOR 1-YARD PROFITS — New heavy-duty LS-98. First time Speed-o-Matic in this class.

How to be AHEAD on every job

...use a Link-Belt Speeder! It's years ahead of the shovel-crane industry

TEAM up with the shovel-crane line that gives you the most productive capacity. It's the only line that offers you true power hydraulic Speed-o-Matic control, *and it's on every model.* Choose from many new models—with pace-setting improvements—in the ½ to 3-yard, 10 to 60-ton range. Equip for extra speed, power and work range—to bid successfully on more jobs—*and earn more on all of them.* See your Link-Belt Speeder distributor for complete facts, or write: Link-Belt Speeder Corporation, Cedar Rapids, Iowa.

LINK-BELT SPEEDER 13,774

Builders of a complete line of crawler and rubber-tired shovel cranes

The four limestone safety trophies, with color reproductions of winning plants, as awarded at N.L.A. convention to plants of the Warner Co., Mississippi Lime Co., and Texas Lime Co.

that he will push forward with a positive, energetic program of promotion.

Safety

In presenting the annual safety awards for 1954, Kent Jander, National Lime Association, reviewed safety accomplishment of member companies over the 20 years of competition sponsored by N.L.A. in cooperation with the Bureau of Mines.

A record low frequency rate of 14.3 was established in 1954 for the 51 participating plants, which was half as great as in 1935 and one-third the highest figure set in 1943. Mr. Jander reminded that a frequency rate higher than 10 is not considered favorable, in emphasizing that greater stress on safety work must continue, in spite of the improved record, to reach the desired goal.

The injury severity rate of 1.748, for 1954 was the third lowest in the in the history of the contest. During a total worktime of 9,594,398 man-hours, which was 12 percent below the aggregate for 1953, there were 137 injuries, a decrease of 28 percent compared with the 1953 total. There were two fatal injuries, three permanent partials and 132 temporary total disabilities. Lost time resulting from these injuries was 16,769 days or almost one-half the loss in 1953.

Injuries from handling material accounted for the greatest number of injuries, falls of persons and machinery accidents were equally divided in second place, and falling objects and haulage accidents were the other principal causes of injuries.

Certificates of honor were awarded by Mr. Jander to 14 operations for injury-free records in 1954, and the winner in each of the four group categories by virtue of having worked greatest number of injury-free man-hours was presented the trophy awarded annually by ROCK PRODUCTS.

Operations with accident-free records for quarries with calcining plants working 100,000 or more man-hours were the following:

Cedar Hollow plant, Warner Co., Devault, Penn.

New Braunfels plant, United States Gypsum Co., New Braunfels, Texas

Natividad plant, Kaiser Aluminum and Chemical Corp., Natividad, Calif.

York plant, National Gypsum Co., York, Penn.

Gibsonburg plant, The Kelley Island Co., Gibsonburg, Ohio

Martinsburg plant, Jones and Laughlin Steel Corp., Blair Limestone Division, Martinsburg, W. Va.

Knoxville plant, The Standard Lime and Stone Co., Knoxville, Tenn.

In the competition for quarries with calcining plants working less than 100,000 man-hours, the Cleburne, Texas, plant of Texas Lime Co. and the Ripplemead, Va., plant of Ripplemead Lime Co. had accident-free records. The Bellefonte, Penn., plant of Warner Co. and the Kimballton, Va., plant of The Standard Lime and Stone Co. had perfect records in the contest for underground mines with calcining plants.

For calcining plants only, perfect records were established by the Peerless plant of Mississippi Lime Co. at Ste. Genevieve, Mo.; the Springfield, Mo., plant of Ash Grove Lime and Portland Cement Co.; and the Ludington, Mich., plant of the Dow Chemical Co.

The ROCK PRODUCTS trophies, which have a colored reproduction of the winning plant on the face of a limestone slab, were awarded to the Cedar Hollow plant of Warner Co. (272,599 man-hours); Cleburne plant of Texas Lime Co. (82,536 man-hours); Bellefonte plant of Warner Co. (539,241 man-hours); and Peerless plant of Mississippi Lime Co. (173,439 man-hours).

Special certificates were awarded the York, Penn., plant of National Gypsum Co., the New Braunfels, Texas, plant of United States Gypsum Co.; and the Natividad, Calif., plant of Kaiser Aluminum and Chemical Corp. for having attained 1000 consecutive days or more without lost-time accident. It was pointed out that the Springfield, Mo., plant of Ash Grove Lime and Portland Cement Co. had attained 2091 consecutive accident-free days as of October 21, making it the first plant to surpass 2000 days.

Planning for Business

The need for application of scientific methods in planning ahead for the conduct of a business was the theme of a talk, "Progress is a Matter of Planning," by P. J. Lovewell, Stanford Research Institute, Palo Alto, Calif.

Mr. Lovewell stressed the need for top company executives to chart the course ahead for their businesses by systematic methods, looking forward for 5, 10 and even 20 years, in order to reduce the risks of "hunch planning."

Five steps were listed as essential to such preparation. First, there is the need to establish owner-management objectives for 5, 10 and 20 years ahead. A company profile should be taken so that assets and limitations would be known. Strengths and weaknesses in all phases of the business would be definitely appraised. The third step would entail economic fore-

(Continued on page 104)

MILL TEST PROVES LONGER LIFE FOR ABK® METAL

This photo, taken in a three-compartment grinding mill, shows at the top: ABK Metal liners installed in 1948; at bottom: the *second* set of steel liner plates installed since then. Both types of liners took the identical rough treatment. The ABK Metal liners are still in good condition. It is estimated that, before requiring replacement, the ABK Metal liners will give from 3 to 4 times the service that liners made of other materials will give.

This performance, in a major cement manufacturing plant, is typical of the longer life that can be expected from ABK Metal liners in all grinding operations . . . in primary, secondary or tertiary stages . . . wet or dry grinding . . . rough stone or finished products.

An exclusive product of American Brake Shoe, ABK Metal is a nickel-chrome iron of controlled structure . . . a metal with extreme hardness (500-700 Brinell, as required) and exceptionally high abrasion resistance.

Cut your replacement, maintenance and downtime costs, increase your mill's efficiency . . . specify ABK Metal next time you need metal liners. Consult us on your specific requirements.

AMERICAN Brake Shoe COMPANY

3245

BRAKE SHOE AND CASTINGS DIVISION

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Photographed in the Natividad quarry are, left to right: Michael Brisch, Rockwell Lime Co., Manitowoc, Wis.,; D. F. Woodbridge, Texas Lime Co., Cleburne, Texas; and Mrs. M. S. Stokes, Batesville White Lime Co., Batesville, Ark.

casts and studies of population growth in their effects. Fourth, markets for existing products must be determined so that a company will know the future for its present products before conducting research on new ones. His fifth point was that the impact of technology be considered since new technology, now at an accelerating pace, cannot only make a company's business but ruin it as well.

Having established a long-range program there is need for constant review and amendment, he said, and he emphasized the desirability of having a great number of people included in the planning program and making their contributions.

Such an approach, said Mr. Lovewell, is good for company morale, and the long-range approach to business conduct will do much to sharpen management thinking.

Washington Scene

Hon. Thomas H. Kuchel, U. S. Senator from California, in his feature address at the concluding session, spoke in glowing terms of the Eisenhower administration's accomplishments and aims.

He believes the prospects are good for the government to start living within its budget and he said that much had already been done to correct what he termed crazy-quilt tax bases which had been in use. He reminded that two tax reductions thusfar have been made by the administration.

Among unsolved domestic problems, he mentioned the great need for accelerated highway building. In his opinion, the Clay committee had presented a good case for the president's proposed highway program but it was defeated because of partisan politics. To emphasize the need for highways, he said that California, with a population of 13 million, had 6 million automobiles.

He concluded by stating that NATO is sound and that this government is dedicated to peace and will defend our country and its friends from aggression.

Future for Industry

A talk by Frank M. Cashin, vice-president, Kaiser Aluminum and Chemical Corp., Oakland, Calif., carried the title "Let's Talk About the Weather." Mr. Cashin did talk about California weather, but he climaxed his talk with a serious view into the future and presentation of the challenge to company management.

He started out with some figures on the weather in California, which he said is responsible for the great growth of the state. Population of California is now 13 million and the influx exceeds 1000 persons a day. In 20 years it is predicted that California's population will have exceeded that for New York State. One-fourth of the total building permits of the country are in California. Most large eastern companies are building plants or planning to build plants in the state. Among other things, he said that expansion in steel and cement production are in need.

He drew some comparisons of production today and 40 years ago, then projected into the future to point up vast production requirements to come and new developments of significance. The prediction was made that by 1965 the sun will provide heat and light, gas turbines will power automobiles, there will be industrial plants powered by atomic energy, commercial jet airplanes will be in wide use and prefabricated buildings will be established practice.

The estimate is that there will be 81 million vehicles on the road as compared to 59 million now, population will be 192 million and 72 million people will be gainfully employed. Industry output will have to be increased by 50 percent to meet the demand. Construction volume will be increased from the present $36½ billion rate to $52 billion in 1975.

Mr. Cashin stressed the need for planning and research to prepare for the future demands and the great responsibility that management must assume. The need will be for more young men in responsible positions to get a fresh point of view and in order to recognize changes. All the phases of a company's activities must be re-examined and weaknesses must be determined and corrected, particularly in the smaller companies.

Soil Stabilization

An illustrated talk on "Soil Stabilization of Roads" by F. N. Hveem, Materials and Research Engineer, California Highway Department, Sacramento, Calif., pointed out both good and bad practices in California.

Photomicrographs showed how lime works to alter clay coverage over sand in lime-soil mixtures and graphs showed the variations of strengths with different limes and how stabilizing value is proportional to the amount of lime. Calcium hydroxide is the significant element in stabilization according to Mr. Hveem's tests.

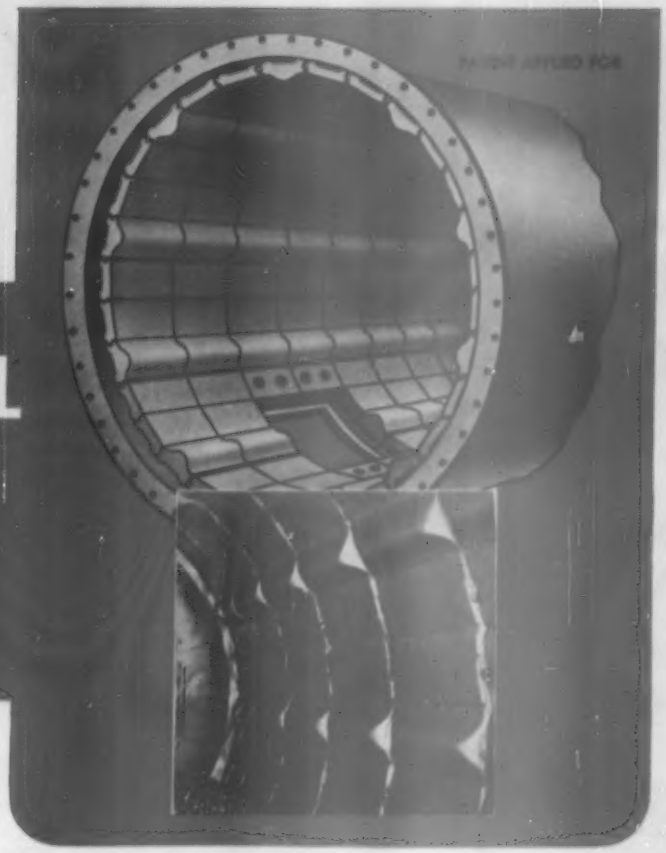
In reply to a question, he said that concrete pavements are laid on a 4-in.

Left to right: Allan Renton, Gaspro, Ltd., Honolulu, Hawaii; Bolton L. Corson, G. & W. H. Corson, Plymouth Meeting, Penn.; John V. Andrews, Chemstone Corp., Cleveland, Ohio; and K. L. Hammond, Keystone Lime Works, Keystone, Ala.

New

B&W UNIVERSAL LINER PLATES

Raise Performance, Lower Costs



The new B&W Tube Mill Liners have advantages that mean reduced costs in capital, time and labor.

Cost per ton of material ground is reduced, for the practical reasons listed below. Check them—you may find that one, or a combination, of these qualities will solve your existing problems.

- Lower Initial Costs—No pattern and chiller costs —the result of standardization.
- Longer life of liners—Uniform wear will result from better quality control on a mass production casting, utilizing permanent molds. Size is ideal for uniform chill and heat-treatment.
- Longer life for different applications can be realized by a selection of proper materials. This design lends itself to either chilled irons or wear steels.
- Direct labor cost and the "down-time" to install the liners are reduced. Castings are easily handled due to small size and weight. Less fatigue of workers. No cranes needed to handle lightweight liner castings.
- Cost reduced for storage space. Minimum storage space required as small castings "stack" easily. Records simplified with one design of casting interchangeable for all size mills.
- Saves money on liner inventory. One design fits all sizes of mills, permitting standardization. Quicker unloading and storage possible.
- Savings in breakage claims and delays for replacements. Hard brittle irons are frequently broken in shipment when large castings are used. Small castings are rugged and almost impossible to break by handling.
- Savings in determining most efficient wear pattern. Same castings will produce wear profiles consisting of all lifter ribs, all flats or combination of both, including straight or spiralled lifter ribs. Straight or staggered circumferential joints can be used.

Liners are supplied in two nominal thicknesses, 1½" and 3" with 1½" high lifters. Castings are 6" wide x 12" long. Positive seating of small castings on mill shell means less breakage of castings under operating conditions. For additional information on B&W Universal Tube Mill Liner Plates, write The Babcock & Wilcox Company, Process Equipment Dept., Barberton, Ohio.

BABCOCK & WILCOX

BOILER DIVISION

S-448

Three Englishmen attended the convention. Left to right: R. G. Jackson, L. B. Ryder, and M. Parkin, all of Imperial Chemical Industries, Buxton, England

thickness of cement-treated base where cement is used. The objective is to reduce erosion from pumping action. Mr. Hveem said that the use of hydrated lime for stabilization where asphaltic treatment is to be applied, say a year hence, results in much better response to the surface treatment.

Ytong

A new use for lime in this country was suggested in a talk, "Ytong-Cellular Concrete Made with Lime," by J. G. Ortengren, president, American Ytong Syndicate, Vancouver, Wash.

As pointed out by Mr. Ortengren, Ytong employs lime alone as the binding material in combination with siliceous material which may be sand, shale, oil shale, diatomaceous earth, fly ash, mine tailings or other. The mixture is aerated by hydrogen gas released when aluminum powder is added, under proper conditions of moisture and heat, to form a cellular structure that is desirable from the standpoint of lightness in weight, insulation value, nailability, etc., when structural units are formed and cured.

Mr. Ortengren mentioned the successful application of such masonry units as introduced in Alberta, Canada, where a highly successful plant started production about one year ago.

J. G. Hawthorne, Mercer Lime and Stone Co., Bronchton, Penn., left, was caught discussing Natividad quarry with **David K. Shroyer,** H. E. Millard Lime and Stone Co., Annville, Penn.

These units have had high acceptance by contractors for their special properties and from the standpoint of economies in construction. A 12- x 18- x 8-in. Ytong unit as made in Canada, because of its lightness in weight and its size, may be laid in a wall for 30 cents which compares with the competitive 8- x 8- x 16-in. concrete masonry unit on the basis of wall-laying cost. Sixty-six units are required for 100 sq. ft. of wall as compared to 113 of the 8-in. competitive units.

Ytong is made in three different densities ranging from 25 to 41 lb. per cu. ft. More aluminum powder is required to produce larger air cells in making the lighter product for insulation purposes. A 41-lb. density for compressive strengths of the order of 800 p.s.i. is used where load-bearing units are required for multi-story construction as done in Sweden where Ytong was developed 26 years ago. A 31-lb. density is standard for conventional one and two-story buildings. Due to the high insulation value, Mr. Ortengren believes that Ytong roof slabs should be of special interest to American builders.

In the plant, the mix is ground in a ball mill, water and aluminum powder are added in a mixer and the total mix is discharged into molds. Due to generation of hydrogen gas, the material rises and the cellular structure results. Initial set requires ten minutes and, by dropping the mold sides, the material is cut to size by steel wires while on a track over which the mold with sides again closed enters an autoclave. Maximum curing pressure is 150 p.s.i. and the total autoclave cycle is 20 hr., after which the units are removed ready for shipment. They have no capillary action since the individual cells are separated from each other, and they have no shrinkage.

Ytong is available for licensing and thusfar, in other countries, is requiring 1000 tons of lime per day. In Sweden alone, 100,000 tons of lime are required for the process annually. This, said Mr. Ortengren, suggests a potential use of two million tons of lime annually in the United States if the product has the acceptance it enjoys in Sweden.

Limes that may be used vary from rich calcitic limes to relatively poor hydraulic limes. It is important that the MgO content not exceed about 5 percent.

After the scheduled meetings, motion pictures were shown of the manufacture of Ytong and its applications. Details on this product were published in ROCK PRODUCTS, June, 1952, p. 106, and April, 1955, p. 222.

Lime Mortars

Norman W. Kelch, A.I.A. Technical Director, Associated Brick Manufacturers of Southern California, Los Angeles, Calif., discussed "The Importance of Lime in Mortar for Structural Brick Masonry."

He mentioned the various specifications tried over the years until the Uniform Building Code adopted the 2:1:9 mix now permissible to resist the highest stresses on masonry walls. The proportion represents two parts cement, one part lime and nine parts sand. Brick walls must withstand flexural, shear and diagonal tension stresses and impact loads imposed by earthquakes. A 1:1:6 mixture with additives seems suitable for necessary resistance to shear, diagonal tension and flexural stresses but needs further testing.

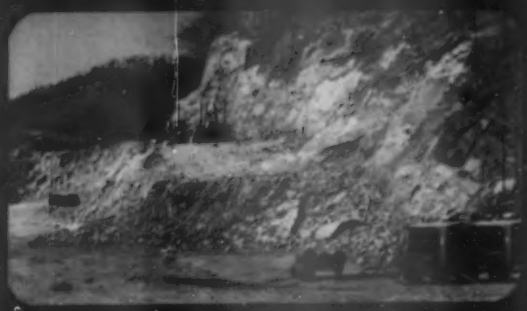
Brick panels, according to the speaker, never fail in compression but mortar bond is important and will find a place in the specifications. Efflorescence is due to sulphate salts and is not attributable to the use of lime in the mortar. Maximum plasticity and water retention are important to hold down the water added and thus the cement.

Mr. Kelch's organization prepares standard specifications for architects and engineers and is now recommend-

(Continued on page 168)

Among father and son combinations were John M. Deeley, senior and junior of Lee Lime Corp., Lee, Mass.

Good Breakage . . .
Good Control . . .
Good neighbors, too!



Holes carefully loaded, adequately stemmed. ROCKMASTER® pattern chosen to hold down noise and vibration . . . hold down rocks and dust.

Peak of blast shows extreme control. Confinement excellent. Breakage good.

No air blast shock. No flying boulders. Broken rock just shoved over. Final pile right in place.

PART of the New York State Thruway runs only 25 feet from the houses of Suffern—50 to 75 feet above them! That's why L. G. De Felice & Son, contractors, had to have extreme control and confinement in blasting out this section of roadbed.

These machine-gun camera photographs prove what extreme confinement of explosive gases, what tight control of vibration and throw were obtained by "shooting it ROCKMASTER." You could hardly hear a rumble. Not a pebble in the air. Most residents never knew a blast had been set off!

Delayed-action ROCKMASTER blasting proves ideal for tight shooting like this. You get superior breakage and control—with a "good neighbor policy" as a bonus.

GET "BETTER BLASTING"

If you are not already getting this informative periodical, let us put your name on our mailing list today.

(P. S.—Tell us who else in your organization should get "Better Blasting", too.)

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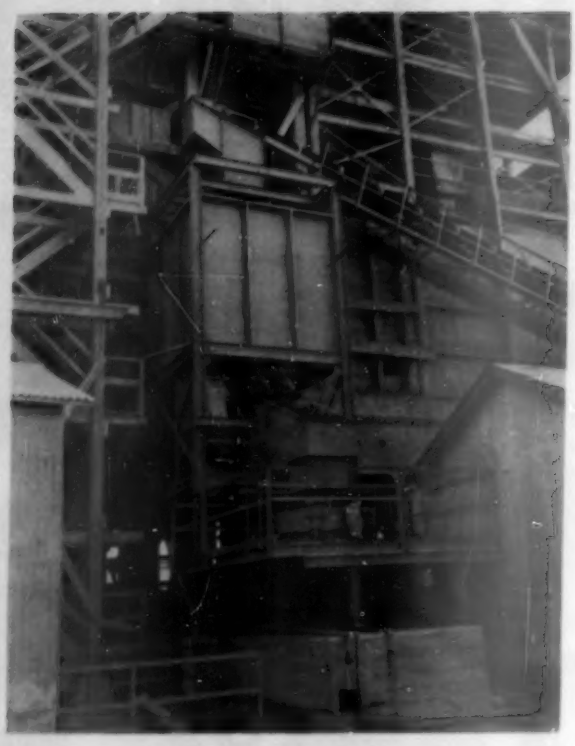
CRUSHING
to Produce More Fines

• Several western sand and gravel producers are using a new type gyratory crusher to obtain a maximum percentage of fines. Also use rod mill for preliminary crushing operation

By WALTER B. LENHART



A 54-in. gyratory type crusher, below, fed by electrically vibrated feeder, above

SEVERAL ROCK PRODUCTS PLANTS in the western part of the United States have installed a new type gyratory crusher having some interesting characteristics. One is in operation in Colorado, one in northern California and a third at the Largo plant of the Consolidated Rock Products Co. in southern California. All are producing material that can be classed as sand although the Largo installation produces a so-called rock dust.

In California large tonnages of crusher-run base are produced, and the specification requires that the base material include about 50 percent rock dust and 50 percent minus 1-in. Normally, fragmentation in the primary and secondary crushers at most plants is not sufficient to produce the required amount of fines. The Consolidated Rock Products Co. installed a 54-in. Nordberg Gyradisc crusher to fill this need. The Colorado operation and the northern California installations are producing sand. The latter uses a minus ½-in. pea gravel as the feed with the finished material augmented by pit-run and a Marcy rod mill product.

The Nordberg Gyradisc crusher is designed to produce large tonnages of minus ¼-in. material from a feed 1-in. and finer. The unit employs a method of reduction in which material is subjected alternately to impacting and then releasing a thick mass of material as important crushing factors. The combination of impacting and attrition in this thick layer of material also aids in the movement of the fines through the crushing chamber. A close setting of the crushing faces is not necessary to produce the desired results, it is said.

The feed material is delivered to the crushing bowl by a rotating-gyrating feeder that acts to evenly distribute the material, layer upon layer in the bowl, and, at the same time to act as a mixer of fine and coarse feed. This tends to prevent packing and is said to increase tonnages. The Gyradisc can operate in open or closed circuit.

Operating Experience

The Largo installation operates in open circuit with the crusher output blended directly with other crushed rock and gravel to get the desired specification. The crusher started operating during May, 1955, and does not run continuously so no figures or estimates are available as to the life

Left: Looking down into crusher. **Right:** A rotating, gyrating feeder superimposes layer upon layer of feed material into crusher which is said to materially increase capacity of the unit

A. P. GREEN
Plastic and Castable Refractories

Give Longer Service . . . Lower Maintenance Costs In Kiln Hoods, Coolers and Dust Collectors

A. P. Green Monolithic Refractory Enclosure on Allis-Chalmers Air Quenching Cooler

A. P. Green Monolithic Hood in Modern Cement Plant

A. P. Green Monolithic Enclosure of Dust Collector Housing

A. P. Green Plastic and Castable Refractories form a one-piece, monolithic, air-tight refractory lining. There are no joints for dust to penetrate, bulging is eliminated, and structural strength is increased. No special shapes are required.

The use of A. P. Green Monolithic Construction is finding wide acceptance in all types of patented coolers. Both monolithic side walls and arches on patented cooler enclosures are setting new standards. They offer ease of installation, provision for positive and free floating anchorage, and joint-free surfaces to resist dust penetration and failure due to bulging and buckling.

In kiln hoods, coolers, and dust collectors of some of today's most modern cement and lime plants, the real and definite advantages of monolithic construction provide longer service, reduced maintenance costs, and higher thermal efficiency. Your A. P. Green representative will show you how you, too, can enjoy these money-saving advantages.

A. P. Green offers a complete line of refractory products for the cement and lime industry. Whatever your requirement, for specific recommendations without obligation, contact your local A. P. Green distributor . . . he's listed in the yellow pages of your telephone directory.

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A. P. Green REFRACTORY PRODUCTS

DISTRIBUTORS IN THE PRINCIPAL CITIES OF THE WORLD

of the manganese steel liners. Dry material is preferred as a feed although some damp material can be processed especially if it is hard and non-porous which might otherwise tend to pancake with higher water content.

At the Largo operation, mill flow of crushed rock and ground stored crushed gravel is used as the feed. The ground stored material is normally a minus ⅜-in. product or pea gravel. Some 1-in. and intermediate sizes can be fed to the Gyradisc either alone or with intermediate sizes. This ground stored material therefore ranges from dry to damp although during most of the year the material is essentially dry. The pit-run is rock and gravel which has been through a 42- x 48-in. Allis-Chalmers jaw primary with a 10-in. fine reduction gyratory, 3-ft. and two 4-ft. Symons cone crushers available for intermediate reduction. Material is granitic in character with a relatively high proportion of large sized gravel in the pit-run. The pit produces some rip-rap and jetty stone, and one unusual feature is the use of a drop-ball ahead of the 3-cu. yd. 85-B Bucyrus-Erie shovel in the pit. The drop ball is a part of a discarded No. 12 gyratory crusher shaft.

Material is fed direct from the mill and also by trucks to a hopper serving an inclined belt conveyor that supplies a rectangular steel bin over the Gyradisc crusher. A 24- x 72-in. Jeffrey-Traylor electrically vibrating feeder delivers the rock to the rotary-gyrating feeder head. Throughs from the crusher go to an inclined belt conveyor for delivery to an older section of the plant for blending into the crusher run road base material. The crusher is driven by a 200-hp. Fairbanks, Morse induction motor through a V-belt. The crusher normally produces 100 t.p.h., using feed materials as shown in the first two columns of the tabulation herewith. The third column is a typical screen analysis of the Largo finished rock dust.

Screen Mesh	Feed 100 T/Hr.	Product	Rock Dust Average
2½ in.	99.9	100.0	
No. 3	78.2	96.6	
4	37.6	87.0	98.6
8	25.0	69.0	78.9
16	19.6	53.1	55.6
30	16.5	38.2	40.0
50	11.6	25.3	27.2
100	6.5	15.1	17.4
200	3.4	9.0	10.4

Results from a second Gyradisc Installation

Feed-Damp gravel
110 T/hr. ½ in. — 100
4 — 25

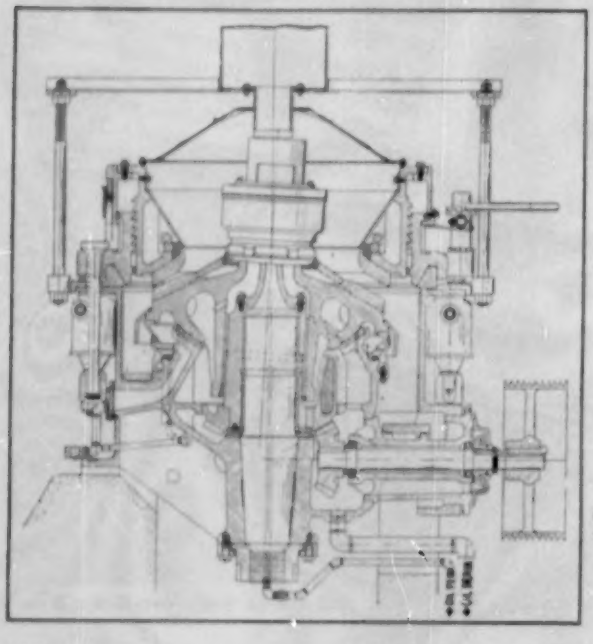
Product
70/T/hr.

Sieve Size	Percent Passing
4	100
8	84
16	55
30	31
50	19
100	9
200	2

Cobbles for Flood Control

The Largo plant also produces cobbles for flood control purposes. These are 4- to 18-in. boulders which are used for dike facing and erosion control river walls. Largo produces 600 to 700 t.p.d. of this material. The scalper screen is a 4- x 12-ft. Tyrock unit which uses 4½-in. plate screen. The plus rock is the source of the cobbles.

Arthur Sanderlin is superintendent of the Largo plant for Consolidated Rock Products Co., and for many years was superintendent of the company's Orange plant. Byron P. Weintz is chief engineer, and R. C. Griffin is production manager. Robert Mitchell is president of the Consolidated Rock Products Co., and Quinten Best is vice-president.



Cross section of new type gyratory crusher

Alkali Content Check Samples

THE PORTLAND CEMENT ASSOCIATION has prepared a set of three "check" samples of varied and carefully determined alkali (Na_2O and K_2O) content. These will serve as a "reference" in analytical work at member-company plants and other organizations interested in research in cement and concrete, such as colleges and universities, commercial testing laboratories, and federal and state agencies. The need for these samples was brought to the Association's attention by the A.S.T.M. Working Committee on Methods of Chemical Analysis.

The samples were analyzed both flame photometrically and gravimetrically. The average values are as follows:

Check Sample No.	Alkali Content — Flame Photometric		Gravimetric	
	Na_2O	K_2O	Na_2O	K_2O
2	0.06	0.25	0.07	0.24
3	0.26	0.70	0.26	0.67
4	0.60	0.14	0.56	0.14

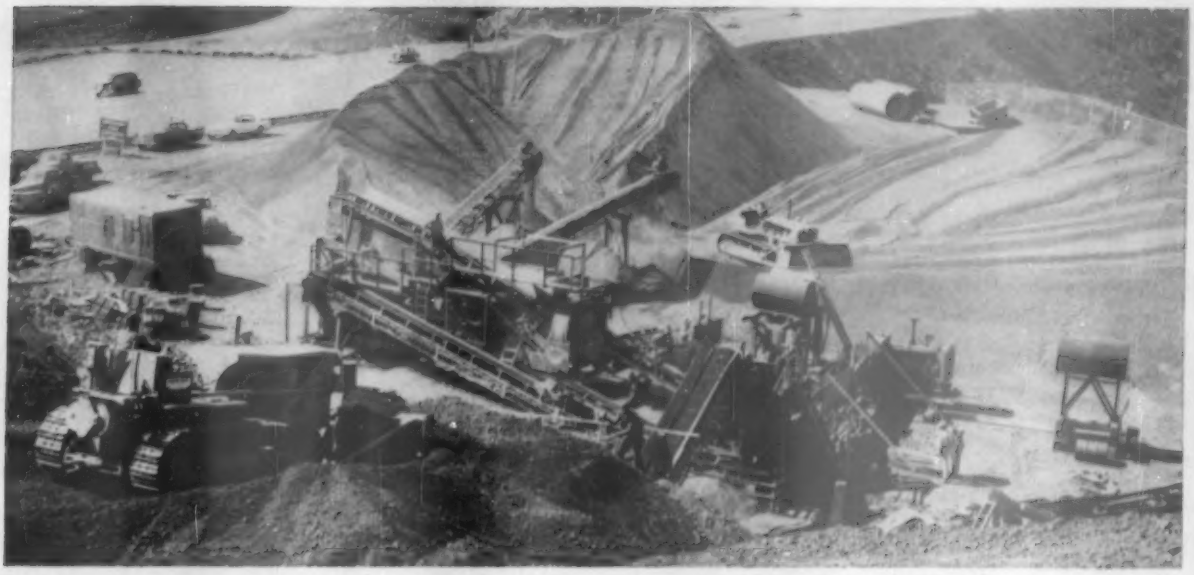
The samples, consisting of two 6-gram portions sealed in glass vials, are priced at $2 each. Orders may be addressed to J. H. Walker, general manager of laboratories, Portland Cement Association, 33 West Grand Avenue, Chicago 10, Ill.

Safety Booklet Issued

NATIONAL LIME ASSOCIATION, Washington, D. C., has published a 44-page illustrated booklet entitled "Safety Standards for the Lime Industry." Authored by Lea P. Warner, Jr., safety director of Warner Company, the publication is intended for use by all company management personnel, serving as a guide to reduce personnel injuries and to improve company safety records. Besides containing standards for both quarry and plant departments, the booklet discusses the organization of company safety programs. It is available in quantity lots at 25¢ per copy, plus postage.

Application of an Expanding Cement

IN EUROPE, cements have been developed which expand early during hardening, especially when kept wet. However, as they dry out, shrinkage occurs and any prestressing of reinforcement initially produced is lost. Hence a cement is needed that will expand after the cement has acquired a suitable initial compressive strength, according to K. Wesche in *Zement-Kalk-Gips* Vol. 8, p. 118, No. 4 (1955).



Harms Brothers, Sacramento, California, reports—

"Our high-output Austin-Western 111 crushing plant produces big tonnage at low cost"

This big, high-speed Austin-Western 111 crushing and screening plant is turning out 1" and ¼" aggregate for Harms Brothers, Sacramento, California, contractors.

They report: "Individual electric motors drive all conveyors and screens on our 111 plant for smooth, high-speed operation. The 10" x 36" jaw crusher, 40" x 24" roll crusher and 4' x 14', 2½ deck screen give us really big capacity. And the construction extras built into this rugged plant keep downtime at a minimum. It all adds up to high output at low cost for more profitable operation."

Harms Brothers' experience is typical of users across the country who have found that Austin-Western wins "hands down" when compared feature-by-feature with other crushing and screening plants. Study the chart at right to see just a few of the reasons why it will pay *you* to compare before you buy. To get complete, detailed information, see your nearby Austin-Western distributor today . . . or write Construction Equipment Division, Baldwin-Lima-Hamilton Corporation, Lima, Ohio.

Why it will pay you to COMPARE before you buy:

COMPARE	A-W	MAKE "X"	MAKE "Y"	MAKE "Z"
1. Steel plate frame for high strength without weight of cast steel frame.	YES	NO	YES	NO
2. Machined steel toggle plate for absolute protection instead of cast iron.	YES	NO	NO	NO
3. Inclined positive-throw type vibrating screen.	YES	YES	NO	YES
4. All moving screen parts operate in rubber bushings that need no lubrication.	YES	NO	NO	NO
5. Over-size self-aligning spherical bearings in crusher.	YES	YES	YES	YES
6. Heat treated chrome vanadium steel shaft in crusher.	YES	NO	NO	NO
7. Individual electric drive motors for all screens and conveyors (optional).	YES	NO	NO	NO
TOTAL	100%	28½%	28½%	28½%

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CRUSHING, SCREENING & WASHING EQUIPMENT

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International distributor delivers...

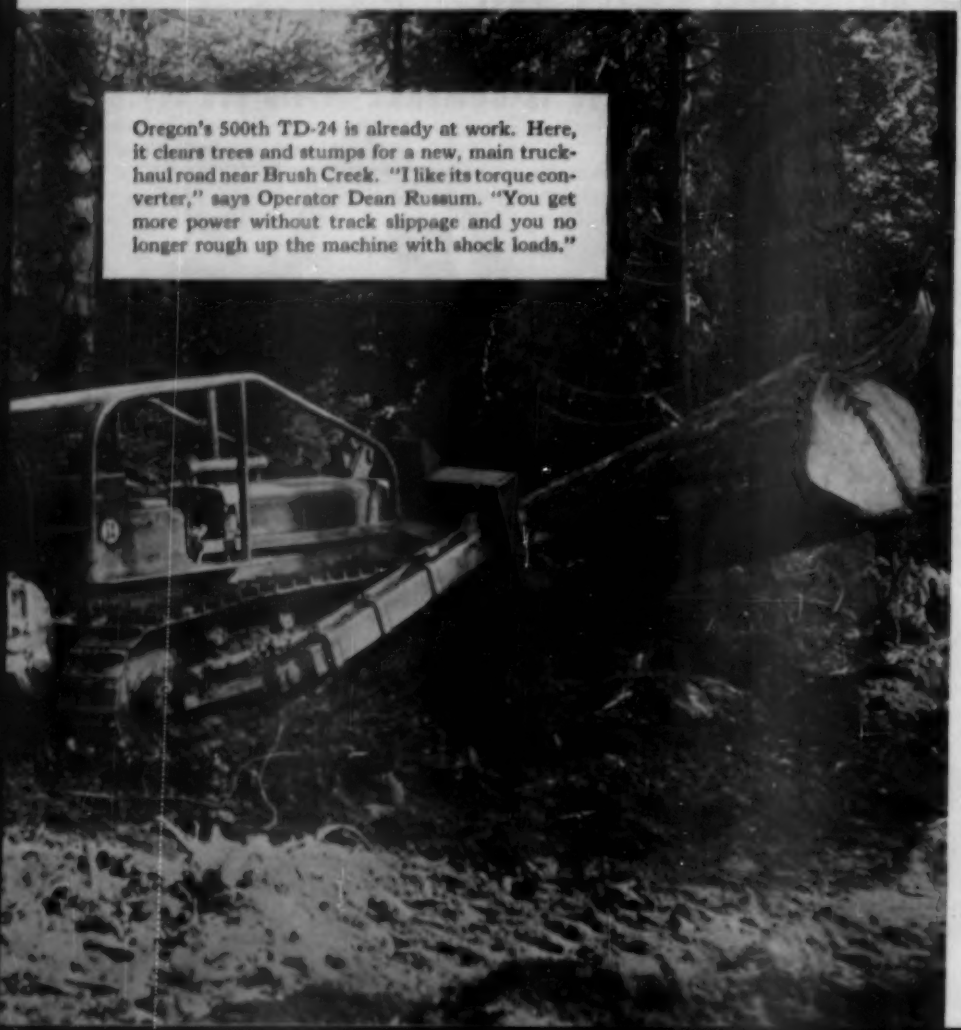
500 TD-24's

For pioneering and road building in the rugged northwest

Howard-Cooper Corporation, one of International's 31 Western area distributors, have just delivered their *500th TD-24!*

You see this big 200 bhp crawler already at work for Wooley Logging Company, Drain, Oregon.

In rough, tough, Pacific Coast, big-scale logging, mining, and earthmoving, profitable production depends upon positive load-control, up-grade or down. *The TD-24 is the only tractor built that has planet-power steering—which gives you constant load control on both tracks when turning.* That's why the TD-24 out-produces the others so decisively, with dozer, arch, or scraper! Another big TD-24 advantage is its built-for-the-West construction. Records, on fleet after fleet, prove that TD-24's stand up under the toughest conditions—and consistently cost less for maintenance than any other make on tracks! TD-24 high-altitude performance is a big advantage, too—so is its seconds-fast, cold-weather starting and operating ease!



Oregon's 500th TD-24 is already at work. Here, it clears trees and stumps for a new, main truck-haul road near Brush Creek. "I like its torque converter," says Operator Dean Russum. "You get more power without track slippage and you no longer rough up the machine with shock loads."

TD-24's

6 for A. J. Orlando on Massachusetts Turnpike—Most of the tractor work on this Whiteside (N.Y.) contractor's 4.89-mile, 2,500,000-yard, $3,340,000 section of the Massachusetts Turnpike is being done by TD-24's. One pushing 3 scrapers accounts for 4,500 pay yards every 10 hours (scrapers on 1,500-ft. one-way hauls). Others pull rippers, level fills, etc.

If you're in the market for a big tractor, you owe it to yourself to check the leader . . . the International TD-24. Five-hundred owners in just one area have proved it their "Best Buy." If it can so successfully and so profitably lick the tough rock, cold weather, and mountain grades of Oregon, it can successfully and profitably lick your high-cost jobs, too! Let us prove its advantages with a demonstration. Call to arrange time and place.

PAY OFF ACROSS THE COUNTRY

6 for J. D. Armstrong on Kansas Turnpike—Of their 9 TD-24's, this Ames (Iowa) contractor reports all have run 5,000 hours or more before needing any repair work. Six on 1.7-mile, million-yard Turnpike section near Emporia, are towing 50-ton rollers, pulling and push-loading scrapers. On hauls of 700 to 2500 ft., they account for 5,000 pay yds. per day.

2 for J. W. Moorman on Buford Dam, Georgia—These "24's", two of the five now owned by Moorman, push-loaded scrapers or pulled 50-ton rubber-tired rollers, 18 hours every day for 18 months. On compaction, they averaged 180,000 cubic yards weekly for the 200-ft.-high, 1630-ft.-long main dam. Moorman's other TD-24's are used to push-load scrapers, and pull or push belt loaders.

3 stripping overburden for Meyer Bros., Pennsylvania—"Proven crawlers," says Partner George Meyer of his TD-24's. "We've used our 3 for 3 years now. They have good balance plus unmatched push power." Right now, rigs are removing 30 feet of shale and clay to uncover a 30-inch vein of bituminous coal. The 2 TD-24's do 80% of the job; a large shovel, 20%.

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HYDRAULIC Transport
of Solid Materials In Pipe

IN THIS ARTICLE

. . . is outlined one of the most complete studies of hydraulic transport of materials in pipe. It is not only of interest to sand and gravel operators, but also to all processors of industrial minerals and cement manufacturers

FOR MANY YEARS THE HYDRAULIC TRANSPORT OF SOLIDS IN PIPES has been successfully applied in a few specialized fields, such as dredging, land reclamation, and the processing of some minerals.* One important installation is that at Copper Cliff, Ont., Canada where 4 million tons a year of tailings are transported by pipeline over a distance of 7½ miles. Another pipeline 5½ miles long is being used to transport one million tons a year of fine coal to a power station at Carling in France. This pipe is 15 in. in diameter, and is fed by five 400-hp. centrifugal pumps. Even for comparatively short distances, however, the power requirements are large, especially when big solids are to be moved: as an example, in the construction of the Beauharnois Power Canal in Canada, one 1500-hp., 18-in. pump was used to deliver through 2000 ft., 120 t.p.h. of rock crushed to 5 in.

Existing installations for hydraulic transport use special centrifugal pumps with impellers capable of passing the largest pieces likely to occur in the mixture. Sometimes the solids and water in the desired proportions are fed to a hopper connected to the suction branch of the pump. The pump then delivers the mixture into the pipeline at a pressure sufficient to overcome the friction resistance and any static head. Where the solids are to be recovered, screening or other separating plant is used at the delivery end of the pipeline. In suction dredging, prior mixing before the pump is not possible and it is necessary to rely on the skill of the operator to keep the suction mouth-piece close enough to the river bed to entrain a large quantity of material without starving the pump of water.

There is considerable interest today in the possibilities of hydraulic transport in other fields, such as the moving of coal in bulk. Large scale laboratory and plant studies are now in progress to provide the basic information on plant operation and the design of new machinery in England for use with coal.

Several experimental installations have been used to study the flow of mixtures in pipes. In a 3-in. pipe system, the mixture was kept in suspension by agitation in a 700-gal. storage tank. A centrifugal pump, driven by a 25-hp. variable speed motor, was fed from this tank and the mixture delivered along the test pipeline and returned to the storage tank. For flow measurement the delivery was diverted into a weighing tank. With this test plant, the secondary methods of measuring flow and concentration, used in a later 6-in. pipe system, were tested.

In the laboratory, it is advantageous to be able to work with high concentrations of solids and at low velocities in the unstable-flow region. It has been found that experimental systems are much more stable when a feeder is used to introduce the solids into the pipeline after the water has been pumped up to pressure separately. With such an arrangement, it is easy to deliver, at low speeds, mixtures of coal and water at concentrations up to 35 percent, by true volume through pipe systems.

A small installation, using 1½-in. transparent pipe, has been very useful. In this plant, the solids are injected by the original 1½-in. reciprocating feeder made in 1952.

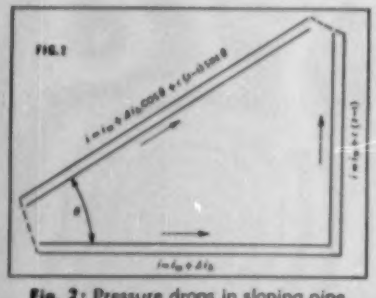

Fig. 2: Pressure drops in sloping pipe

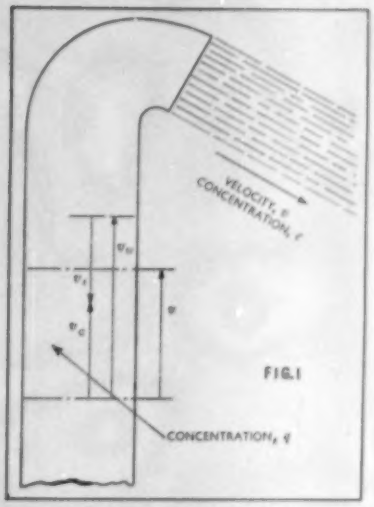

Fig. 1: Various velocities for flow upwards in vertical pipe

When the flow of mixtures in pipelines is being studied, the difficulties of measurements are considerably greater than with water alone. Besides the flow rate, there is also the concentration to be controlled and measured, and it is difficult to know whether steady conditions obtain throughout the system. Test results are often not repeatable to better than plus or minus 10 percent.

Flow of Solid—Liquid Mixtures in Pipes

The behavior of mixtures of solid particles and a liquid flowing in a pipe differs from that of a simple liquid, especially when the particles are denser than the liquid and their size is greater than about 1/500 in.

In a horizontal pipe, gravity tends to stratify the mixture into two distinct layers; a lower layer of solids and an upper one of liquid. Re-mixing of these two layers may be achieved by cross-turbulence in the liquid but this occurs only at very high speeds or with relatively fine particles (less than ⅛ in.).

In a vertical pipe, the flow conditions are simpler. Gravity forces on the particles act in the same line as the pressure gradient and average velocity; the separating effect is then easily overcome and the solids are uniformly distributed across the pipe section.

Little is yet known about the effect of mixed sizes of solids. Providing that they are all above ⅛ in., experiments show little or no effect due to size grading so long as the particles are all greater than ⅛ in. When the solids

*From a paper presented in March, 1955, by R. C. Worster and D. F. Denny, British Hydro-mechanics Research Association, to the Institution of Mechanical Engineers in London.

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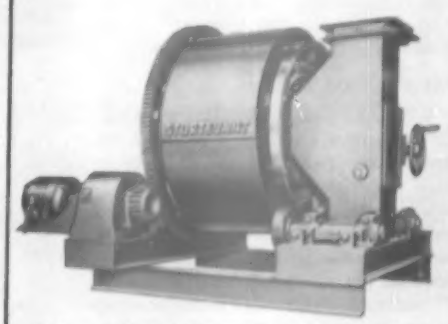

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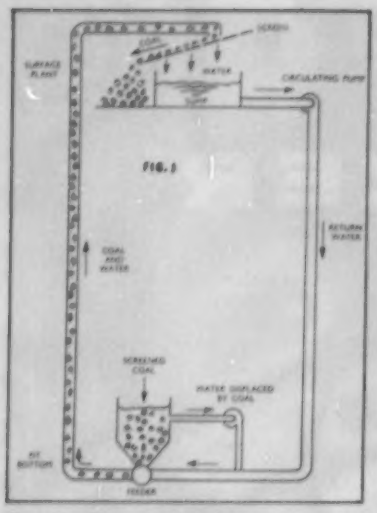

Fig. 3: Typical closed-cycle transport system employing feeder

are made up of a mixture of very large and very small particles, it is not possible to say what will take place. At low speeds the large solids travel as a deep sliding bed and a great deal of the smaller material is trapped in the interstices of the larger. At high speeds, the fine material may be completely suspended in the liquid, thus making a "heavy medium" in which the large solids are carried along as if they were in a liquid of greater density; that is, with a pressure gradient of less than that corresponding to that of the large solids in water alone. No quantitive information yet exists on this aspect.

Solids of non-uniform densities have not been investigated properly. It has been observed that, with a mixture of gravel and coal, the gravel tends to collect together and travel in "dunes" at the bottom of the pipe. In some circumstances this may be dangerous, but the overall pressure drop along the pipe is not likely to be much greater than that for the mean density of the solids.

Effect of Pipe Surface

When the pipe wall differs in physical properties from those of steel, or when the solids transported differ from such materials as gravel or coal, significantly different pressure drops may be observed. For instance, lining a pipe with polytetrafluorethylene (P.T.F.E.) reduces the excess pressure by about 25 percent. With rubber particles small in comparison with the pipe, a reduction of pressure drop below the normal also takes place (Durand 1953); however, large rubber particles tend to bridge across the pipe section with consequent increase in the pressure drop. The roughness of the pipe walls and aging effects will not usually be important because the presence of hard materials like sand or coal will smooth the pipe wall.

Flow in Vertical Pipes

In upward flow, the solid particles slip backwards at about their free settling velocity, v_s (Fig. 1). The water consequently travels more quickly than the mean speed, and the solid particles more slowly, the difference being dependent on the ratio of the slip velocity, v_s, to the mean velocity, v, and also on the concentration of solids being transported.

Flow in Sloping Pipes

Tests have been made with a 1½-in. pipe system on the pressure drops in pipes inclined both up and down, at several angles. They served to confirm that the excess pressure drop caused by the solids in the sloping pipe was equal to the sum of the excess pressure drops in the corresponding horizontal and vertical pipes joining the same end points, as shown in Fig. 2. This result has not been checked for larger pipes. As in vertical pipes, the static lift in feet of water head should be taken into account in order to obtain the difference in pressures as measured by gauges at the bottom and the top of the pipeline.

System Characteristics

The maximum size of solids that can be passed through a pipe is not easy to fix. At low concentrations and high velocities, single lumps almost as big as the pipe will even pass safely around the pipe bends. It seems that the essential requirements at moderate speeds is that the sliding bed of solids should leave sufficient free space above it for the largest particles to turn over freely, Fig. 3. Clearly, therefore, the maximum size of solids being transported depends, at these speeds, on the concentration in the pipe. In an emergency it is possible for tightly packed solids to move along a parallel straight pipe, but in flowing around a pipe bend the packed bed must shear internally. In doing this there is a dilatation and the solids are very likely to seize and stop the flow. It is usually at a bend or restriction that a pipeline carrying solids will choke, and it may be desirable to provide means of emptying the pipe at such danger spots.

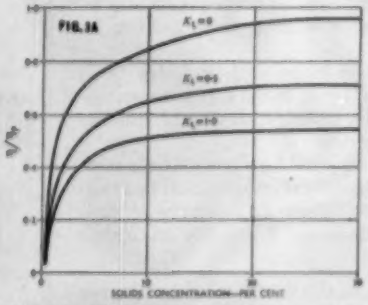

Fig. 3A: Effects of solids concentration and leakage on lifting efficiency, N_l, of a closed-cycle feeder system. Note: Feeder power is neglected;

K_L equals $\frac{\text{feeder leakage}}{\text{solids throughput}}$

N_p is the displaced-water pump efficiency

Table A: Minimum Speeds For Reasonable Concentrations Of Coal or Gravel

Pipe Dia. Inches	Minimum speed, feet per second	
	Gravel	Coal
1	3	1½
3	7	3½
6	10	5
9	13	6½
12	15	7½
18	17½	8¾

In most instances, the settling velocity of solids in water is small, as may be seen in Table B.

Table B: Settling Velocity of Solids in Water

Screen Size Inches	Free fall, feet per second		Settling velocity at 30 percent concentration, feet per second	
	Gravel	Coal	Gravel	Coal
¼	0.3	0.15	0.2	0.1
¼	1.0	0.5	0.7	0.35
1	2.0	1.0	1.4	0.7
1	3.5	1.7	2.4	1.2

For instance, if the horizontal pipes are chosen to be of 10-in. bore with a mean speed of 9 f.p.s., the water friction losses in the vertical pipe would be about 0.03 ft. of water per foot of pipe. A change to 12-in. pipe for the vertical line only would reduce the speed to about 6.25 f.p.s. and the pressure gradient to 0.012 ft. of water per foot of pipe. In a 1000-ft. lift this represents a saving of perhaps 12 ft. of water friction, which is hardly significant. Practice may show that other factors such as pipe wear make the use of lower vertical-pipe velocities desirable.

Methods of Pumping Solids

Low-pressure Systems — The simplest method of pumping solids is to mix them with the desired amount of water in a tank and then pass them through a centrifugal pump, the passages of which are wide enough to take the largest particles. If the pump speed and solids feed rate are constant, there is no difficulty in maintaining a uniform flow in the pipe.

This method is widely used for conveying fine material, and one notable scheme is that at Carling, where five centrifugal pumps in series convey colliery tailings to a power station over a distance of 5½ miles[8].

It is usual with solid pumps to pressure-grease the internal bearings and to flush the glands continuously with clean water, but the real problem is the erosion of the volute and impeller

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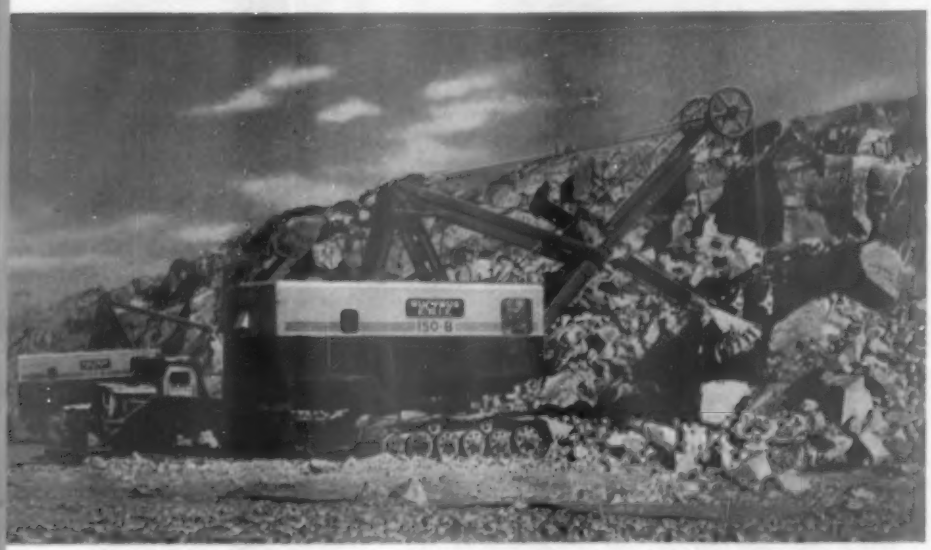

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and it is this factor which restricts their use. For instance, when handling solids the pump speed is limited and the maximum head available is about 150 ft. per stage, so that a single pump is sufficient only for comparatively short-distance transport unless staging is employed. Even with fine coal, erosion of high-speed pumps may be serious.

High-pressure Systems — Long-distance horizontal transport or vertical lifts from deep mines necessitate a very high pressure at the entry to the pipe system, or boosters along its length. This can be achieved by any of the following methods:

(1) The use of several centrifugal pumps in series.

(2) The solids and water may be passed together through a positive-displacement pump. The problem of valves for such a pump is a serious one, for their lift or opening must be sufficient to allow the largest particles to pass freely through, and they are also subject to damage by the particles on the sealing surfaces. So far as is known this method has not been used for solids larger than ⅛-in., but there is the possibility of designing a special valve for a pump to handle much larger solids than this with an efficiency better than that of the corresponding centrifugal pump.

(3) The solids may be fed mechanically into the pipeline after the water has been raised to the necessary pressure. Several designs of feeding machine have been tested, and these will later be described more fully. It is the essence of all such machines that they release water to atmospheric pressure at the same volume rate as the solids feed, and this, together with leakage water, must be pumped back into the pipe. The pressure of the system at this point is at its highest and repumping of the displaced water, which may be heavily laden with fine material, presents a problem. Design of suitable centrifugal pumps for this duty may be difficult and, in many instances, the size and cost of cleaning plant for this purpose would be prohibitive. A positive-displacement pump may often be a better solution.

System Cycles

Hydraulic transport systems may be divided into two categories; closed cycle and open cycle, according to whether the liquid conveying the solids is recirculated and used again or not.

Open cycles are applicable only where there is ample supply of liquid near the inlet end of the pipeline, and means of disposing of the liquid at the discharge end of the pipe. The conveying liquid will be contaminated by fine particles and, in an open-cycle system, it may be difficult to dispose of, or uneconomic to clean. A typical application of the open cycle is the lifting of coal from a mine where water is available at the pit bottom.

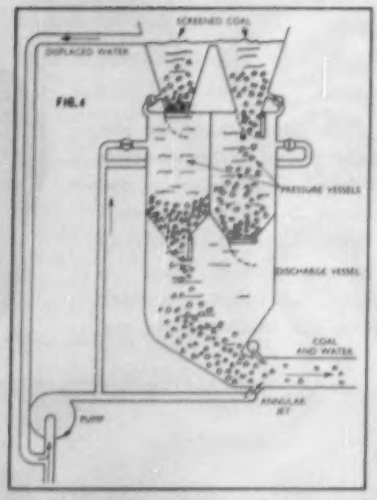

Fig. 4: Lock-hopper feeder for screened material

In the closed cycle (Fig. 3A) the water used to convey the solids is returned, after separation at the discharge end, and used again. In this way, both the provision of a continuous supply of water and its subsequent disposal after contamination are avoided. However, the fines that would otherwise accumulate in the system must be withdrawn at a rate sufficient to keep their concentration at an acceptable level.

A closed cycle would be essential for lifting coal or other mineral from a dry mine, and for systems using liquid media other than water.

Types of Solids-feeding Machine

Feeders may be divided into two categories, those in which the only moving parts of the machine are valves, and those in which the moving parts themselves convey the solids from a region of low pressure (hopper) to a region of high pressure (delivery line). In practice, however, the problems of both types are almost identical. Except for the lock-hopper feeder, machines for feeding solids other than coal into high-pressure pipelines have not been developed.

One design of the first type, a lock-hopper feeder made by a commercial company for the Ministry of Fuel and Power, consists of two pressure vessels each communicating alternately with a hopper and a discharge vessel as shown in Fig. 4.

As an indication of size, the outer vessel is 8 ft. in diameter and 15 ft. high; the main valves are elliptical and measure 18- x 24-in. The throughput of the machine will be determined not so much by the time cycle of events as by the rate at which coal can fall through the valves against the up-flowing displaced water. With 3-in. coal the particle velocity through the valves is unlikely to exceed 1 f.p.s., which corresponds to a throughput of about 100 t.p.h.

The main point in favor of the lock-hopper feeder is that the leakage from the pipe to the hopper can be very small. This is a very important factor in the efficiency of the transport system. The valves move only after the pressures on either side are balanced, so that the power needed is small and erosion of the surface is minimized.

Very large vessels are unsuitable for high pressures, and it may be necessary to use small vessels with a correspondingly short time cycle. The control system is complex, there being four coal valves and at least four water valves to be operated in their correct sequence.

The feature common to feeders of the moving-pocket type is that solids from the hopper are induced to fill a pocket within the moving part of the machine, and this pocket then travels to a position where water at high pressure drives the solids into the delivery pipe. The throughput of such a machine is proportional to the linear speed of the pocket, and to its volume, provided that it completely fills and empties.

If the particles are merely allowed to fill the pockets by gravity, the speed and hence the throughput of the machine is seriously restricted by the slow rate of filling and, in practice, some inducement for the particles to move quickly is essential. This can be achieved by circulating the solids and water through the pocket, in one side and out the other, but this involves a solids-handling pump and unnecessary degradation of the particles. An alternative method is to circulate only the water, the solids being restrained from leaving the pocket by a suitable grating across the outlet, as shown in Fig. 5.

Provided that the grating forms part of the moving member of the machine rather than part of the body, the grating is self-cleaning, because flow through it is reversed when the solids are discharged from the pocket. With

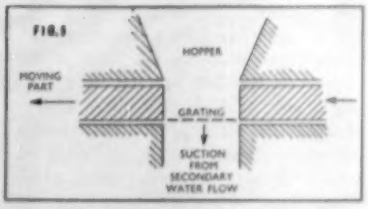

Fig. 5: Moving-pocket feeder

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this method of filling the pocket, the throughput of the machine is now limited by the rate of emptying the pocket, which is a function of the quantity flow in the pipeline and thus normally beyond control.

The restriction of leakage from the high-pressure side to the hopper is the major problem for wherever seals may be fitted they have at some time to pass over the rough edges either of the pocket or of the hopper opening; this virtually eliminates the use of deformable materials such as rubber.

The present solution is to rely on close clearances to restrain leakage, but though this is satisfactory when the machine is new, wear inevitably results in increased leakage.

With these feeders, the moving parts must be capable of chopping those particles which can neither squeeze into the pocket nor climb from it at the moment of closing of the gap. It is thus undesirable that these "chopping" edges, which necessarily become damaged, should be relied on to seal the leakage.

There are many forms the feeder can take; two are illustrated in Figs. 6 and 7.

Reciprocating Feeders

In the double-acting reciprocating feeder (Fig. 6), a plunger containing two rectangular pockets is reciprocated so that at each end of the stroke one pocket lies beneath a hopper and is filled with coal, while the other pocket falls opposite the pipeline into which its load of coal is discharged. The delivery from a single machine of this design is interrupted for a short time during each stroke because of the lap necessary to restrict axial leakage from the pressure pipe to the hopper. This interruption can be avoided either by allowing a continuous bypass of water round the feeder, which lowers the delivered concentration, or by intermittent bypass of water through radial holes in the plunger. The 50 t.p.h. prototype machine at B.H.R.A. (details of which are given below) employs the latter method, but the flow is not uniform and the best solution seems to be to use two or more machines in parallel. A triple-plunger feeder for 100 t.p.h. on these lines is being constructed for installation in a pit.

Rotary Feeders

From a design standpoint, continuous motion is advantageous because the drive is so much simpler and the inertia of the moving parts less than with the corresponding reciprocating machine. To minimize inertia is important in regard to jamming of the machine by metal objects that may

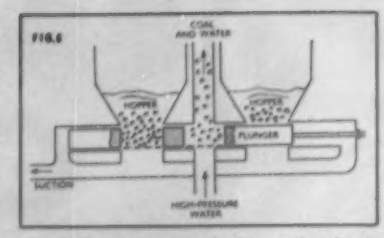

Fig. 6: Reciprocating double-acting feeder type

fall in the hopper. On the other hand, from a hydraulic point of view, the pockets have less chance to fill and empty when moving continuously than when reversing at each end of a reciprocating stroke.

The choice of arrangement of rotary feeders is wide, though in practice many designs cannot be considered for high-pressure applications on account of their inherently high leakage.

One form of rotary feeder, in which all the pipe and hopper aperatures lie in one end face is shown in Fig. 7. With duplicate hopper and discharge pipes, the machine is symmetrical about a diameter, and with five or more pockets in the rotor the discharge is completely uniform. A small Perspex model has been tested and has given promising results. The rotating disk must be loaded against the body under all conditions so as to keep the clearance small, but the force must not be allowed to cause excessive wear. Control of the force under varying flow conditions will probably be the main design problem.

Measurements

In simple hydraulic-transport schemes, such as those used in gravel pits or for dredging where the feed rate of solids is not easily controlled, it is common practice to operate at high speed and low concentration because of the danger of blocking the pipe. If suitable instruments to measure concentration and velocity were available they might help greatly in increasing the throughput of the system even though the power saving might not be very important. In a large and more steady system, such as that envisaged for transport from a colliery to a power station, considerable power may be involved and the efficiency would then be important. In general, efficiency and safety go in opposite directions, so that the lower the velocity and the higher the concentration the greater is the need for precise knowledge of the conditions in the pipeline.

Measurement of Flow or Velocity — In view of the relative ease with which solids are accelerated in water, a venturi-type nozzle was tried in a vertical pipe on the 3-in. coal system. Handling water alone it was found to have a discharge coefficient of 0.95 and, when handling coal-water mixtures at speeds down to 1½ f.p.s., the discharge coefficient fell to 0.93 plus or minus 2.6 percent if the head differential was measured in feet of water. If, however, the differential was measured in feet of mixture density, the discharge coefficient became 0.955 plus or minus 2.2 percent. This suggests that mixture density should be used rather than liquid density in calculating the differential on the nozzle.

One company has used a similar device comprising an eccentric nozzle in a horizontal pipe, which has been shown to have the same discharge coefficient with solids as with water if the differential head is measured in feet of water head. With this arrangement there is a minimum speed (corresponding to the existence of an appreciable bed of solids) below which this device must not be used.

Other devices at present available for the measurement of velocity include one (based on electromagnetic induction) which is manufactured in Holland for dredging applications, and another where Coriolis forces on a curved rotating pipe are used to measure the total mass flow.

Measurement of Concentration

Concentration can, of course, be measured by sampling the delivery, but what is really wanted is an instrument which can be fitted at any place in the pipeline to indicate the concentration present there (which is greater than the concentration delivered). As far back as 1948, one company had developed electrical-conductivity methods of measuring the proportion of air bubbles in a flowing air-water mixture and the same technique was applied to the measurement of the concentration of gravel and sand present in a horizontal pipe.[1] A special shape of electrode was found to make the instrument insensitive to the actual position of the solids in the pipeline.

Very recently a commercial device working on this principle has appeared in Holland. Such methods of measurement involve difficulties due to the varying conductivity of the water itself. Where the solids have an electrical conductivity of the same order as the water, the calibration of the device will depend on the ratio of the two conductivities so that it is difficult to apply the method to the measurement of coal concentration. The fine-coal pipeline at Carling is fitted with a gamma-ray absorption type of instrument which measures the total mass within the pipe from which the mass concentration present in the pipe

[1]Durand and Condolios, 1952.
[2]Gibrat and Chenin, 1954.

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MARION 362	1½	24'-8"	18'-2"	100'-0"	37	—	—	1½—2	398-D
MARION 372	—	—	—	100'-0"	43	—	—	—	—
MARION 83-M	2	24'-8"	18'-2"	120'-0"	60	—	—	2—2¼	414
MARION 87-M	—	—	—	140'-0"	75	—	—	—	—
MARION 93-M	2½	27'-4"	20'-0"	120'-0"	80	—	—	—	397-E
MARION 101-M	3	27'-4"	20'-0"	120'-0"	84	—	—	—	417
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can be deduced directly.[2] This again is a rather complicated installation.

Abrasion and Wear of Plant

In some instances where hard particles have been transported pneumatically, a very short life of only a few days has been reported for pipe bends. In hydraulic gravel-handling plants (where the velocities are about double those required for coal transport) the pipe may last a year or more if it is rotated periodically so that the wear is distributed around its periphery. Pipe bends may last four or six months before they require patching. Centrifugal-pump impellers made of abrasion-resisting steel may need replacing in a year, even though their speeds are generally low. A rubber lining to a pump or pipeline completely eliminates wear but it is liable to be cut by large sharp flints, or pieces of metal. The use of rubber lining is usually restricted to gravel no larger than about ¾ in., and precautions must be taken to keep out pieces of metal. Because coal is less sharp and less dense, the limiting size of coal for rubber-lined pumps might be raised to about 2 in., but there is no experience on this point since the centrifugal pumps used in washeries are usually of low head, and of simple iron construction.

The damage to a pipeline when transporting coal will be much less than when transporting gravel. The coal pipeline at Hammersmith which was in use for more than ten years appeared to have lost 0.1 in. of its wall thickness at the bottom (Fig. 8), but it is not known how much coal was transported through this pipe or how often it was allowed to stand empty and corrode. The pipe could have been turned round into two other positions so that a real working life of at least ten years may be expected for a coal-transport pipe. Pipe bends are likely to have a shorter life and there is the danger that erosion at misfitting pipe joints may be important.

Other workers[2] in this field, all report a rapid increase in erosion with speed, usually as the cube of particle speed. The character of the wear depends on the angle of attack and with sliding or scraping the rate of wear increases almost in proportion as the particle size. It also increases with solids concentration. Naturally, it also depends on the curvature of the wall and on the density and hardness and irregularity of the particles. With normal impact the phenomena are rather different; for instance, particle size is said to have little effect.

The outstanding characteristics of hydraulic transport systems are the large power required and the high capacity of pipes of quite modest sizes.

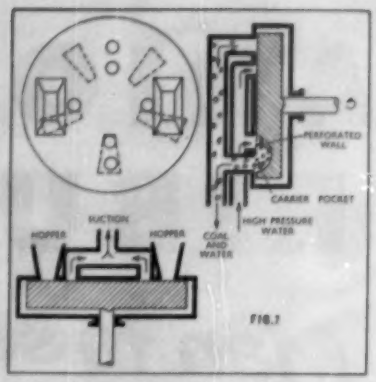

Fig. 7: Disc feeder design

Conclusions

The compactness of the conduit gives hydraulic transport great advantages for conveying solids in confined spaces or where there are obstructions making it impossible to route directly. The ease of hydraulic "loading" and "unloading" is also important.

Permanent pipelines working with reasonable prospect of safety must be carefully designed and controlled to ensure stability in operation. To a large extent this depends on the combined characteristics of the pump and the pipeline and on the method of control of water and solids feed. Automatic control by instruments measuring pressure, velocity or concentration seems desirable for large-scale installations working continuously.

It seems clear that with soft solids such as coal, a reasonable life of machinery and pipes can be expected, but with hard materials like sand, abrasion is severe and fairly frequent replacements of parts may be necessary.

Acknowledgement is due to the Institution of Mechanical Engineers, London, for permission to publish the above, and to the British Hydromechanics Research Association at Harlow, Essex, England, their deputy director of research, R. C. Worster and research engineer D. F. Denny, the authors of the paper.

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[2]Bergeron, 1952.

Glossary of Geologic Terms

"GLOSSARY OF SELECTED GEOLOGIC TERMS, with Special Reference to Their Use in Engineering" by Wm. Lee Stokes and David J. Varnes, has been published in Colorado Scientific Society Proceedings Volume 16. The 165-page report is intended to provide civil engineers and specialists in related fields with a technical glossary of terms commonly used by geologists. The style is semi-encyclopedic, with some digressions into geologic processes, occurrences and uses of minerals and rocks, and their engineering significance. About two-thirds of the definitions are said to be revised beyond definitions currently available. The glossary, which contains about 2670 entries, can be obtained from the Colorado Scientific Society, Box 688, Denver 1, Colo. The price is $2.75 paper bound, $3.50 cloth bound.

Israel Cement to U. S.

ISRAEL'S FIRST SHIPMENT of portland cement to the U. S. was delivered in August to Bridgeport, Conn. The 75,000-bag cargo originated at the Nesher Portland Cement Works, Ltd., Haifa, the largest of Israel's three cement plants. The 6000-mile trip across the Mediterranean and Atlantic took 17 days.

Until last year, Israel had a cement shortage but, due to increased output by new production units, the country has an exportable surplus. Last year's production exceeded 560,000 tons.

Record Cement Sales

BESSEMER LIMESTONE AND CEMENT CO., Youngstown, Ohio, reported earnings of $577,045 or $1.90 per common share in the six months ended June 30, compared to $375,922 or $1.23 a share in the comparable 1954 half year. Sales were $3,693,359—the greatest in the company's history—compared with $3,268,605 a year ago.

Three for One Stock Split

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Reveal Practical Ideas On SAFETY

• National Safety Congress meetings in Chicago show how members of Cement and Quarry section have promoted safer operating practices

T. W. Jones, outgoing general chairman, who holds National Safety Council service plaque which was presented to him by **Merrill C. Pollard,** 1954 chairman

PRACTICAL ASPECTS OF SAFETY received considerable attention at the annual meeting of the Cement and Quarry Section held as part of the 43rd National Safety Congress in Chicago, Ill., on October 17-21. Meeting in two afternoon sessions (October 17 and 18) at the Conrad Hilton Hotel, the group witnessed two innovations—a panel skit demonstrating the successful "safety observer" program developed by Universal Atlas Cement Co., and "Safety Ideas Illustrated," in which nearly 100 slides featuring practical safety ideas of several companies were shown. In addition, papers were presented on color dynamics, a new method of measuring work injury experience, and a phenomenal case history safety story of a member company, which reduced its accidents 80 percent in 2½ years.

At a combined luncheon of the Cement and Quarry, Coal Mining, and Mining sections, S. H. Ash, technical assistant, U. S. Bureau of Mines, received a National Safety Council citation for distinguished service to safety which was presented by David L. Arm, manager of the Council's industrial department. Walter F. Gries, superintendent, welfare department, Cleveland-Cliffs Iron Co., Ishpeming, Mich., in an amusing after dinner talk entitled "Drill Cores," used appropriate dialects in describing the melting pot of miners who migrated to the upper Michigan mining district. He maintained that these people are real Americans — partaking in joys that freemen know.

The Portland Cement Association, along with ten other national trade associations, were honored during the Congress for outstanding work in safety in 1954. Each association received the Council's "Association Award." Ivan LeGore, safety director, Portland Cement Association, presided over an association round-table discussion preceding the award luncheon.

Elect New Officers

New officers of the Cement and Quarry Section were elected during the meeting. These include general chairman, Howard Riefenstahl, Alpha Portland Cement Co., Easton, Penn.; first vice-chairman, Seymour B. Fleming, New York Trap Rock Corp., New York, N. Y.; second vice-chairman, Paul J. Worseck, Lehigh Portland Cement Co., Allentown, Penn.; and secretary, Walter H. Dearth, Jr., General Crushed Stone Co., Easton, Penn.

T. W. Jones, New Haven Trap Co., New Haven, Conn. (outgoing chairman), in reporting on the past year's activities of the executive committee, told of meetings held in Chicago, New York, and Pittsburgh. He reported that the membership increased 7 percent during the year and that a new membership campaign has been inaugurated. He announced that the Visual Aids Committee is preparing a new colored film entitled "Watch That Face" and that the Engineering Committee is revising the Lime Data Sheet. In honor of his outstanding work as chairman, Mr. Jones received a National Safety Council service plaque.

Getting Everyone Into the Act

Utilization of the entire company personnel in selling safety was demonstrated in a four-act panel skit by members of the Universal Atlas Cement Co., Buffington, Ind. Participants were A. H. Adams, plant manager, A. S. Hetherington, safety engineer, and H. F. Stokes (who was moderator) and C. R. Bulger, industrial relations supervisor and assistant supervisor, respectively. The company's safety observer program is designed to expedite corrective action by management of those unsafe acts and unsafe conditions observed and reported by the employe. Being the one closest to the job, the employe is considered the best means of uncovering unsafe conditions. The program has proved beneficial in stimulating employe's interest in safety, and it gives recognition to those employes whose suggestions are accepted. Since the program was started in 1952, 487 employe recommendations have been submitted. Employe interest has been growing, it was reported; during the

Executive Committee members of the Cement and Quarry Section. Bottom row, left to right: W. H. Dearth, Jr., General Crushed Stone Co., committee secretary; Ivan F. Le Gore, Portland Cement Association, Chicago; Merrill C. Pollard, National Gypsum Co.; Howard Riefenstahl, Alpha Portland Cement Co., chairman; and Gil G. Grieve, National Safety Council staff representative. Middle row, left to right: Wm. A. Kipp, Universal Atlas Cement Co.; Dorse D. Seiple, Jr., Standard Slag Co; Fred E. Storch, Whitehall Cement Mfg. Co; T. W. Jones and Raymond H. Greene, both of the New Haven Trap Rock Co.; and Seymour B. Fleming, New York Trap Rock Co., first vice-chairman. Top row, left to right: P. J. Worseck, Lehigh Portland Cement Co.; C. J. Herzog, Keystone Division, Dravo Corp.; H. F. Johnston, The Funkhouser Co.; and Lea P. Warner, Jr., Warner Co., Philadelphia, Penn.

"Eucs" pace production at Nelson Crushed Stone Ltd.

Powered by a 200 h.p. engine with 10-speed transmission, the Model 31 TD Rear-Dump "Euc" has a top travel speed of 32 m.p.h. with full payload . . . one of the reasons "Eucs" haul more tonnage at lower cost.

The limestone quarry and plant of Nelson Crushed Stone Ltd., north of Hamilton, Ontario, is one of Canada's newest and most modern operations. This stone plant, with a capacity of more than 500 tons per hour, was designed for maximum efficiency and flexibility—it can produce virtually any size stone.

Three 22-ton Rear-Dump "Eucs", loaded by a 2½ yd. shovel, haul dolomite to a primary crusher about ¼ mile from the face. Equipped with quarry bodies having flared sides that facilitate loading and minimize spillage, these "Eucs" have 300 h.p. engines and 10 speed transmissions.

Rear-Dump Euclids are standard off-the-highway hauling units in mines and quarries because of their ability to stay on the job year after year with low maintenance cost. For a production and cost estimate on your operation get in touch with your Euclid dealer . . . there's no cost or obligation.

Rugged construction of the body and frame enables "Eucs" to withstand the impact of loading rock and other heavy excavation with large loading equipment. Here a 2½ yd. shovel loads 22 tons of dolomite for haul to the primary crusher.

EUCLID DIVISION GENERAL MOTORS CORPORATION, Cleveland 17, Ohio

Euclid Equipment

FOR MOVING EARTH, ROCK, COAL AND ORE

Universal Atlas Cement Co. employes who participated in a safety skit, "Getting Everyone in the Act," left to right: A. H. Adams, C. R. Bugler, A. S. Hetherington, and H. F. Stokes

first half of 1955, more than 200 ideas have been submitted.

In this program, there is an employe safety observer in each department, who is elected annually by the department employes from a group of 4 or 5 candidates originally selected by the individual foreman. Any unsafe practice noted by either the observer or employe is recorded on an individual safety observation report by the observer and forwarded to the respective foreman for initialling. In no event are employe names or payroll numbers referred to in the reports.

Each week the reports are collected and studied by a four man safety observation committee, which includes the assistant plant manager, supervisor of industrial relations, general operating foreman, and general yard and transportation foreman. Each report is judged and given a 1 to 4 point rating, depending on its merits. If a recommendation is rejected, both the foreman and safety observer are given the reason for rejection. If accepted, an authorization form is attached to the report and forwarded to the proper department for implementation. This department is then required to notify the committee as to the completion and date of completion, after which the observer is notified.

Every three months a prize (pair of safety shoes) is given to the observer having the most points (not the most recommendations) amassed during quarter. The prize is presented at quarterly meetings conducted by the industrial relations department and attended by the safety observer, department heads, plant manager and his assistant. At these meetings the safety observers are encouraged and coached in their duties, and their performance is reviewed. Plans for the following three months are also reviewed. Sound slide-films, safety graphs, and other visual aids are utilized in aiding the observer to detect unsafe practices.

In concluding, the panel moderator stated that the program has proved highly beneficial to the company, since it provides a means for the man on the job to make safety recommendations, expedites the follow-up and corrective action by management, and gives recognition to the employe's contribution.

Changes in the "American Standards Association Method of Recording and Measuring Work Injury Experience, A-16.1-1954" were reviewed by Henry G. Lamb, safety engineer, A.S.A., New York, N. Y. He stated that the new Standard which became effective January 1, 1955, represents a considerable improvement over the previous (1945) ruling. The format is completely new, with definitions of occupational diseases covered in the first part of the publication instead of being scattered throughout. Individual injuries are now grouped into five classes instead of six. Of great significance, he said, is the standardizing of frequency and severity rates to total days charged per million man hours. In the case of the severity rate, this means moving the decimal point three places to the right. This was done to make the severity rate (now a 3-digit number instead of a decimal) seem more realistic.

In the 1954 Standard there is a new head and foot bone chart, used for charging amputations, in which every bone (rather than just the digit) is numbered. Time will still be charged for total loss of hearing, but not for partial hearing loss. Special provision has been made for back injuries and hernias. Now, only certain hernias (rather than all hernias) are charged. The speaker also reported that a special section has been added for counting injuries arising from external events, such as the large Texas City industrial disaster a few years ago.

In the new standard the seven-man Committee of Judges which reviews controversial injury cases is now referred to as the Committee of Interpretations; already it has acted upon 40 of 55 cases submitted this year. Mr. Lamb emphasized that companies having borderline cases requiring study by the Committee send in nine copies of the request to the Committee.

Safety Success Story

A remarkable success story was revealed by George L. Kirp, vice-president in charge of production, Material Service Corp., Chicago, Ill., in an illustrated talk entitled "How We Reduced Accidents 80 Percent in 2½ Years." The story demonstrated what great strides can be taken when management gets 100 percent behind safety. Mr. Kirp pointed out that Material Service has had an unusually high hazard potential based upon (1) its vast scope of operations (the company operates about 50 plants or yards, where crushed stone, gravel, lime, ready-mixed concrete, pipe, and other building materials are produced or marketed; (2) its great expansion in recent years involving the dovetailing of heavy construction with operation; and (3) high labor turnover with many of the workers unskilled. Until a few years ago the company felt it had little time for safety; this attitude was reflected in its high frequency and serverity rates of 69.29 and 75.14, respectively, reached in 1951. Realizing the seriousness of the problem, the company set up a safety department, employed a safety engineer, and developed a bona fide safety program, with the result that in the ensuing year, the safety record showed phenomenal

Left to right: Arvid Tienson, George L. Kirp, Douglas Kirp, and Wallace Wonders, all of Material Service Corp., Chicago, Ill. Mr. Kirp reported how his company reduced accidents by 80 percent in 2½ years

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improvement. By mid-1955, the frequency and severity rates fell to a record low of 16.55 and 1.70, respectively.

The program adopted was threefold, and entailed developing a proper attitude on the part of supervision, on the part of the employes, and a safe work environment. Among the first projects developed were 21-page safety guide booklets for supervisors and employes. The supervisor guide emphasizes that each foreman is expected to consider safety an integral part of his duties and that he is to be held fully responsible for safety in his department. To stimulate the movement, the company holds weekly safety meetings for foremen at the larger plants and for several group supervisors from smaller plants. Each supervisor is also held responsible for indoctrinating new employes with safety; the safety guide is especially helpful in this instruction. The company also developed an "Introductory Followup and Instructions of New Employe" form. For accidents it has a special "Accident Follow Up Report."

Monthly safety meetings for employes and safety committees at each operation are basic parts of the program, Mr. Kirp pointed out. Short safety talks, visual materials, including movies, plus occasional participation by Safety Department personnel aid local supervisors in conducting the meetings. Generally at each meeting a specific and timely subject is discussed thoroughly, with maximum participation by the employes. Employe safety recommendations are also considered at these meetings.

Another safety stimulant is the "Monthly Safety Comment" — published by Safety Department. This newsletter gives information regarding accidents, as well as personal interest items. Safety bulletin boards are also used extensively. Competition among plants is fostered by publishing the relative safety standings every month in the newsletter. As an annual reward, Material Service gives a banquet to each plant operating without a lost time accident during the entire year. A first aid training program has also been developed, the speaker stated. At each operation at least one person (sometimes two) has a certificate from a Red Cross First Aid Training Course.

Regarding work environment, the company found out that the three principal areas requiring protection were the head, feet, and eyes, in order of importance. Hard hats and safety goggles are provided for the majority of operations, and the company obtains safety shoes at cost and also contributes a dollar toward their purchase as an added incentive. Mr. Kirp stated that nearly 100 percent of employes wear safety shoes, eliminating foot injuries almost completely. The company also provides many other types of protective equipment.

Thos. R. Donoghue, Pittsburgh Plate Glass Co., who discussed the growing use of color dynamics

Safety is also fostered through monthly safety inspections by the Safety Department. Recommendations are made to both the superintendent and to top management. In all cases the department works through the supervisor rather than the employe.

As a result of the safety effort, Mr. Kirp pointed out that the company has noted a decided improvement in company morale, less employe turnover, increased production and lower operating costs, and a decided reduction in compensation and medical costs.

Among the safety honors received by the company recently were the National Safety Council Award of Merit in 1953 for the entire company, the Council's Award of Honor in 1954 for the entire company, the 1954 Sentinels of Safety Trophy for first place won by the Thornton Quarry, Bureau of Mines Certificates of Achievement (for three quarries), and Greater Chicago Safety Council awards. Mr. Kirp concluded with the thought that the company expects to show continued improvements and that it has not yet realized all the benefits of its safety program.

Color Dynamics

In a paper entitled "Use of Color in the Cement and Quarry Industries," Thos. R. Donoghue, manager, safety and plant protection, Pittsburgh Plate Glass Co., Pittsburgh, Penn., pointed out that color dynamics (the correct use of energy in color) can yield numerous benefits when applied to industry. These include more efficient use of light, decrease in eye strain, simplification of housekeeping, reduction in hazards, general uplift in employe morale, better public relations, and increased production and quality of workmanship. He cited the experience of a large steel plant where color dynamics was gradually applied in repainting the buildings and equipment. Over the three-year period, records revealed a reduction of 38 percent in lost-time accidents, a reduction of absenteeism from 5 to 2 percent and of labor turnover from 4.5 to 0.4 percent due to improved employe morale, and a 10 percent increase in production efficiency.

Through use of colored slides, Mr. Donoghue outlined a standard color code for safety. Yellow is the high visibility color, and is used for marking aisles and for obstructions; yellow with black stripes marks nonmoving obstructions (low clearance, etc.). Orange and red are used for "on guard" situations, orange for machinery guards, doors of switch boxes, etc., and red for fire protection. Blue, used on tags or flags, designates machine out of order or down for repair. First aid equipment and cabinets are painted green (or green cross). White is used for traffic flow lines, waste receptacles, etc.

Various colors are also used to distinguish pipe lines; for example, red for fire protection, yellow and orange for steam and hot water, blue for dangerous chemical liquids, and green, gray, white or black for air and water. In many instances valves or fittings are also painted; some companies use decals.

The speaker concluded with slides showing actual applications in the industry. A classic example was one of the Ideal Portland Cement Co. plants, where principles of color dynamics were used throughout the operation. Of striking appearance were the yellow grinding mills. In one of the Pittsburgh Plate Glass plants, a variety of colors were used on machine shop equipment. Cutting edges of individual machines were made to stand out.

Safety Hints and Helps

A highlight of the meeting was the presentation of slides illustrating practical safety ideas which were developed by several member companies. This feature was a product of the Visual Aids Committee headed by C. J. Herzog, Keystone Division, Dravo Corp. Companies submitting slides with appropriate descriptions included Material Service Corp., Standard Slag Co., Universal Atlas Cement Co.,

(Continued on page 156)

SECO DRY SCREENS GLACIAL SAND ON MOUNTAIN TOP

PHOTOGRAPHED ON THE JOB AT EMPORIUM, PENNA.

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You'll find Seco vibrating screens in some of the most remote parts of the country screening everything under the sun. But this is the first time your Seco On-The-Job Reporter has ever seen a glacial sand deposit on top of a mountain. This is a fact and it exists just outside of the busy town of Emporium, Penna.

The 4 x 10 double deck Seco vibrating screen pictured above is the only equipment used in preparing this sand for market. Shown here, it is producing about 15 TPH of mason sand and about 15 TPH of concrete sand and could easily double this production, if desired. Like so many other operators, Thompson-Montgomery are more than pleased with the trouble-free, efficient performance of this Seco Vibrating Screen. Isn't this what you want on your job? Write, wire or phone.

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Sand and Gravel Safety Contest Awards

• National Sand and Gravel Association announces winners of new 1955 safety contest and the Bureau of Mines awards for 1954

THE NATIONAL SAND AND GRAVEL ASSOCIATION has announced the results of its 1955 safety contest, covering the period from July 1, 1954 through June 30, 1955. The 1955 contest is the first actually conducted by the Association. Previously the annual contests had been conducted by the U. S. Bureau of Mines for the Association.

The winning plant in the Class A competition, for plants producing more than 500,000 tons of sand and gravel during the contest period, is The Sun Valley Plant of Consolidated Rock Products Co., Los Angeles, Calif. The Sun Valley plant had the greatest combined total of tons of sand and gravel produced and man-hours worked without a single lost-time injury during the contest period. Certificates of Achievement in Safety will be awarded to 17 plants with accident-free records also entered in the Class A competition.

Of the plants entered in the Class B competition, for plants producing between 200,000 and 500,000 tons of sand and gravel during the contest period, 34 had accident-free records. The Romayor Plant of the Texas Construction Material Co., Houston, Texas, with the greatest combined total of tons of sand and gravel produced and man-hours worked, will be awarded the Class B trophy.

Thirty-eight plants entered in the Class C competition, for plants producing less than 200,000 tons of sand and gravel during the contest period, had accident-free records. The Lemon Cove Plant No. 113, Pacific Coast Aggregates, Inc., San Francisco, Calif., will be awarded the Class C trophy.

A total of 200 plants were enrolled by 125 member companies in 1955, the largest number in the history of the Association safety contest. The previous high was a total of 141 sand and gravel plants enrolled in the 1954 competition. The Bureau of Mines reported a record high of 9,882,928 man-hours worked by the plants participating in the 1954 contest. The 1955 contest has surpassed the previous high with a record of 14,448,730 man-hours worked by employes of participating plants and a production of 98,219,565 tons of sand and gravel produced by these plants.

The trophies will be presented by ROCK PRODUCTS to the three winning plants at the Association convention in Chicago, Ill., February 13-16, 1956. Certificates of Achievement in Safety will be mailed to the accident-free plants which did not receive trophies, and all production and distribution employes of the three trophy-winning plants will be awarded Certificates of Accomplishment in Safety.

Accident-free plants receiving Certificates of Achievement in Safety are as follows:

Class A

Consolidated Rock Products Co., Los Angeles, Calif., Hewitt plant
Dravo Corp., Pittsburgh, Penn., Neville Island plant
John M. Ferry, Glendale, Calif., John M. Ferry plant
Jahncke Service, Inc., New Orleans, La., Flint Sand and Gravel Co., plant
Lyman-Richey Sand & Gravel Corp., Omaha, Nebr., Nos. 5, 6, 9, 10 and 11 plants
Material Service Corp., Chicago, Ill., Algonquin plant and Cayuga plant
Pacific Coast Aggregates, Inc., San Francisco, Calif., Centerville No. 106 plant, Eliot No. 104 plant, and Kerlinger No. 114 plant
Pfohl Bros., Inc., Cheektowaga, N. Y., Lancaster plant
Texas Construction Material Co., Houston, Texas, Eagle Lake plant
Warner Co., Philadelphia, Penn., "Dredge Franklin"
Western Indiana Gravel Co., Lafayette, Ind., Lafayette plant
Winter Brothers Material Co., Inc., Kirkwood, Mo., Kirkwood plant

Class B

Acme Materials Co., Phoenix, Ariz., Rock plant
American Aggregates Corp., Greenville, Ohio, Richmond plant
Basic Construction Materials, Division of New York Coal Co., Chillicothe, Ohio, Basic Construction Materials plant
Bryan Rock & Sand Co., Raleigh, N. C., Paddleclock plant
Concrete Materials Co., Waterloo, Iowa, West Des Moines plant
Consolidated Rock Products Co., Los Angeles, Calif., Claremont plant
Consolidated Stone & Sand Co., Montclair Heights, N. J., Riverdale plant
Eastern Rock Products, Inc., Utica., N. Y., Barneveld No. 2 and Boonville No. 1 plants
Fort Worth Sand & Gravel Co., Inc., Fort Worth, Texas, Bennett plant
Fountain Sand & Gravel Co., Pueblo, Colo., Pueblo plant
Gifford-Hill & Co., Inc., Dallas, Texas, Bobwyn plant
Greenville Gravel Co., Greenville, Miss., Greenville plant
Guaranteed Gravel & Sand Co., Mankato, Minn., Mankato plant
Hartland Sand & Gravel Co., Hartland, Wis., Hartland plant
Hurst Gravel Co., Fort Worth, Texas, Quigley plant
Kern Rock Co., Bakersfield, Calif., Cottonwood and Union Paving plants
Lincoln Sand & Gravel Co., Lincoln, Nebr., Fremont plant
Edw. Lutz Sand & Gravel Co., Inc., Milwaukee, Wis., Sussex-Merton plant
Lyman-Richey Sand & Gravel Corp., Omaha, Nebr., No. 2 plant, No. 7 plant, Nos. 12 and 13 plants
Marquette Cement Manufacturing Co., Chicago, Ill., Memphis Sand plant
Mississippi River Sand & Material Co., St. Louis Mo., Victor Street plant
Pacific Coast Aggregates, Inc., San Francisco, Calif., Olympia No. 126 plant
Rubber City Sand & Gravel Co., Akron, Ohio, Knight plant
Shippingport Sand & Gravel Co., Shippingport, Penn., Shippingport plant
Southern Pacific Milling Co., Ventura, Calif., El Rio plant and Santa Paula plant
Texas Construction Material Co., Houston, Texas, Alleyton No. 1 plant and No. 24 plant
Union Sand & Gravel Co., Spokane, Wash., Fort Wright plant and Yardley plant
Western Indiana Gravel Co., Lafayette, Ind., South Bend plant

Class C

Airport Sand & Gravel Co., Wyoming, Penn., Wyoming plant
American Aggregates Corp., Greenville, Ohio, Fort Jefferson plant and South plant
Arrow Sand & Gravel Co., Columbus, Ohio, Grandview plant
Blue River Sand & Gravel Co., Blue Rapids, Kan., Blue Rapids plant
Brooks Sand & Gravel Co., Kingsport, Tenn., Erwin plant
The Buffalo Slag Co., Inc., Buffalo, N. Y., "A8" plant, "C" plant, and "F" plant
Cemstone Products Co., St. Paul, Minn., Lakeland plant and Westcott plant
Concrete Materials Co., Waterloo, Iowa, Waterloo plant
Concrete Materials & Construction Co., Cedar Rapids, Iowa, Cedar Rapids and Marshalltown sand plants
Decatur Sand & Gravel Co., Edgerton, Wis., Edgerton plant
Graham Brothers, Inc., El Monte, Calif., San Juan Capistrano plant
Hampshire Sand & Gravel Co., Inc., Westhampton, Mass., Westhampton plant
The Walt Keeler Co., Inc., Wichita, Kans., Sand plant
Lorain Elyria Sand Co., Lorain, Ohio, Lorain plant
Lyman-Richey Sand & Gravel Corp., Omaha, Nebr., No. 15 plant and No. 23 plant
Muskogee Materials Co., Muskogee, Okla., Muskogee plant
Nathan Oaks & Sons, Oaks Corners, N. Y., Oaks Corners plant
Pacific Coast Aggregates, Inc., San Francisco, Calif., Pratteo No. 109 and Lapis No. 110 plants, and Yolo No. 131 plant
Pine Bluff Sand & Gravel Co., Pine Bluff, Ark., Pine Bluff plant
Ray Industries, Inc., Oxford, Mich., Oxford plant
F. M. Reeves & Sons, Inc., Pecos, Texas, Imperial plant
Riverside Gravel, Bismarck, N. D., Schmidt plant
Roseburg Sand & Gravel Co., Roseburg, Ore., Roseburg plant
C. W. Shirey Co., Waterloo, Iowa, Waterloo plant
South Bend Sand & Gravel Corp., South Bend, Ind., South Bend plant
Texas Construction Material Co., Houston, Texas, Alleyton No. 21 plant and Corrigan plant
Waverly Gravel & Tile Co., Shell Rock, Iowa, Shell Rock plant
The Windsor Building Supplies Co., Inc., Newburgh, N. Y., Plum Point plant

1954 N.S.G.A. Safety Contest

THE UNITED STATES BUREAU OF MINES has announced the winners of the 31st annual National Sand and Gravel Association safety contest, conducted by the Bureau in 1954. The Eagle Lake, Texas, plant, a dredge operation of Texas Construction Material Co., was the winner in the group for plants working more than 100,000 man-hours. In 1954, this plant had an injury-free safety record for a work period of 162,200 man-hours.

(Continued on page 164)

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Mining Congress Covers New Industrial Minerals Developments

• American Mining Congress meetings in Las Vegas, Nev., reveals progress in milling and metallurgy, flotation, drilling, new gypsum and cement plants, and two-way radio communication

INDUSTRIAL MINERAL PRODUCERS and metal miners from the far corners of the country attended the 1955 American Mining Congress in Las Vegas, Nev., from October 10 to 13. This meeting was Las Vegas' first big convention and the fabulous glamor spots were filled to capacity. The New Frontier Hotel was the headquarters for the Congress.

The registration list was heavy with names of people connected with the uranium mining industry, and many of the programs were slanted in that direction. The western industrial mineral producers were there in considerable number, and these included many representatives of practically every portland cement company in the West and many from the Atlantic Coast. Lime and gypsum producers were also much in evidence. The sand and gravel industry was not too well represented, especially from the southern California section, as a strike of teamsters started the week prior to the meeting. The next meeting will be held in Los Angeles in 1957, and it will be an exhibit year.

The first day's meeting covered the subjects of National Policy and the Mining Industry. Labor and Management Problems and Public Relations were the subjects of another session. Milling and Metallurgy was the topic for a third session, and this subject was covered by men connected with the manganese and iron ore dressing industry. R. E. Durocher, Jones & Laughlin Steel Corp., discussed the use of the Aerofall mill at one of the company's properties. This type of mill conceivably could be used to prepare dry kiln feeds in the portland cement industry, and in other fine grinding operations. Essentially it is a large diameter ball mill, similar to the older Hadsell mill, some 20 ft. or more in diameter and provided with lifters and liners so that the cascading rock in the mill act as the grinding media although steel balls can also be added to the load if desired. Fans withdraw the ground rock and deliver it to dry separators with the plus material going back to the mill. Several are in use in asbestos processing plants in Canada. A fourth session covered "Exploration and Geology" and was mainly a metal mining subject.

Sessions on the second day included a Public Land Panel, a Drilling and Roof Support symposium, Uranium Milling, Outlook for the Mineral Industry, Improved Mining Methods and Equipment, and Uranium Exploration and Development.

Separate sessions on the third day covered such subjects as Tariff, Taxation, Open Pit Mining, Uranium Mining, Stockpiling in Government Mineral Programs, A.E.C. Policies, Outlook for the Industry, and Industrial Minerals. Outside of the open pit mining discussion and the latter session, most of the other meetings held little of interest to the rock products industry.

Industrial Minerals

The Industrial Minerals session was presided over by H. L. Waldthausen, Jr., works manager, Blue Diamond Corporation, Blue Diamond, Nev. The first speaker was Frank L. Marsh, assistant to the president, Lauhoff Grain Co., Danville, Ill. Mr. Marsh spoke on the manufacture of gypsum products and was well qualified for the task as he was connected with the gypsum industry for 25 years, having served as director of research and later, director of development, for the National Gypsum Co., the second largest gypsum and wallboard producer in the world. He still is connected with the gypsum industry indirectly for his company manufactures adhesives and starch additives that are widely used in the manufacture of gypsum wallboard and similar products. Mr. Marsh said there were ten companies in the United States that manufacture gypsum wallboard and lath, operating 46 plants. At the present time, the speaker said, there were at least seven more plants in some stage of construction and others being expanded. He outlined domestic production and the plants that receive raw gypsum by water from Canada and Mexican sources. These included such cities as Chicago, Detroit, Portsmouth, N. H., Boston, New York, Baltimore, Philadelphia, Savannah, Ga.; Jacksonville, Fla.; Long Beach, San Francisco, and Seattle. Two plants, now under construction in New Orleans, will receive water-borne gypsum rock. The larger companies own thir own boats. Buffalo, N. Y., was about the only large city that had close-by gypsum deposits and these are underground mines. Other inland towns that are off the beaten paths that have wallboard plants are Rotan, Hamlin, and Acme, Texas; Medicine Lodge, Kan.; Sigurd, Utah; Gerlach and Blue Diamond, Nev.; Shoals, Ind.; Gypsum, Ohio; National City, Mich.; Southard, Okla. and many others. The speaker said one company in Ohio was using heavy media flotation to improve the grade of rock.

The speaker pointed out that most of the companies produced their own retarder; several have large facilities for the manufacture of their own paper used for wallboard, lath, and sheathing.

The speaker outlined the many uses for gypsum, its origin, and the manufacturing processes, including some details on the production of wallboard. He mentioned the use of deliquescent salts in the calcining process so as to reduce the amount of water needed to get a workable mix for the wallboard, lath and sheathing production. Some stuccos, he said, used up to 90 lb. of water per 100 lb. of stucco, but by the proper "know-how" this water-load could be reduced to 56 to 58 lb. of water per 100 lb. of stucco, thereby taking a heavy load off the dryers. The speaker also spoke of the use of prepared foam at the wet mixers ahead of the forming rolls and that certain types of starch added to the mix had some definite advantages. He spoke briefly on the problems of over-retarding and over-accelerating for wallboard production. Mr. Marsh also told of

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the use of cork fragments, expanded perlite, ground waste paper, and a more recent development, the use of glass fibers as a part of the core in gypsum products. He said it was quite common practice to mix the gypsum, foam, accelerator, other additives in a continuous manner with the mixing time being as low as two seconds.

The use of direct-fired and steam dryers was described. Normal thicknesses of boards, he said, were ⅜ in. and ½ in., although some ⅝-in. thick board is made to meet special fire-resistant codes. The manufacture of ¼-in. board is becoming a minor item, the speaker said.

Mr. Marsh dwelt briefly on the gypsum association to which many of the larger companies belong, and of the technical problems committee that is a part of that association, however, most of the companies handle their own technical problems.

It was quite obvious that after hearing Mr. Marsh's talk that the gypsum industry is expanding rapidly, that extremely large investments are required, that to stay in the business a company is compelled to develop new products and expand the use of older ones, and that the competitive picture in the years ahead, might be quite rugged.

New Cement Plant

Wilson C. Hanna, vice-president in charge of technical developments for the California Portland Cement Co., illustrated his talk with slides showing the new $12,00,000 portland cement plant located at Creal, Calif., near Mojave in Kern County and about 100 miles northeast of Los Angeles. The operation features three quarries and two 11- x 350-ft. Allis-Chalmers dry process kilns. In the quarry, drilling equipment includes an Ingersoll Rand quarrymaster drill and some Gardner-Denver units. For loading, there are two 4½-cu. yd. P & H shovels. Primary haulage is by a fleet of four 25-cu. yd. Mack body trucks.

The primary crusher is an 84- x 66-in. Superior, Allis-Chalmers gyratory crusher driven by a 250-hp. motor. The opening is set to deliver a 10-in. product. A No. 9 Superior gyratory driven by a 150-hp. motor takes the stone down to 4 in. A 42-in. belt conveyor delivers stone to a Pennsylvania impactor driven by a 600-hp. motor. The minus 4-in. rock from the secondary crusher goes to a Robins scalper screen with the plus ¾-in. stone going to the impactor. Allis-Chalmers screens are used in closed circuit with the impactor. The crushing plant has a capacity of 350 to 400 t.p.h.

On the raw side, there are five 10½- x 17-ft. Allis-Chalmers ball mills in closed circuit with Sturtevant separators, and the ball mills have a capacity of 90 t.p.h. at 90 percent minus 200-mesh, the speaker said. Each are driven by a 1000-hp. motor

The two kilns will produce 3000 bbl. of clinker per day. The kilns are gas-fired, and are driven by two 60-hp. motors. Multiclones and electrical precipitators supplied by Western Precipitation Co. are used on the kilns. Rust Engineering Co. supplied the engineering service.

On the finish side are three Allis-Chalmers ball mills of the same size as those used on the raw end. Each mill is expected to produce 405 bbl. per hr. at the fineness specified. A St. Regis packer is used for the sacked material with facilities for bulk deliveries. There are 15 Norblo dust collectors.

Mr. Hanna described the general layout of the plant, including storage capacities for the raw material, clinker, blending and other silos. For blending on the raw side, seven Merrick Weightometers are available as feed-outs, and adequate blending and mixing is provided by recirculation.

The final speaker was O. J. Scherer, consulting engineer, Las Vegas, Nev., who told the audience about the perlite industry. He said that the cost of expanding perlite was being reduced to as low as 6 cents per cu. ft. He felt that the perlite industry was going ahead and was on a good foundation.

Motion Pictures

The various sessions were opened by showing motion pictures. Among the movies shown were: "Gray Gold from the Mother Lode," presented by the Calaveras Cement Co., showing the San Andreas, Calif., operations; "Mining for Nickel" by the International Nickel Co.; "A" for Atom;" and "The Atom Goes to Sea" by the General Electric Co.; and "Iron Ore from Cerro Boliver," by the United States Steel Corporation. Other pictures shown were provided by the U. S. Bureau of Mines; Natural Resources Committee, Utah Chamber of Commerce; Erie Mining Co.; American Zinc Institute; U. S. Atomic Energy Commission; National Association of Manufacturers; and the U. S. Air Force.

Field Trips

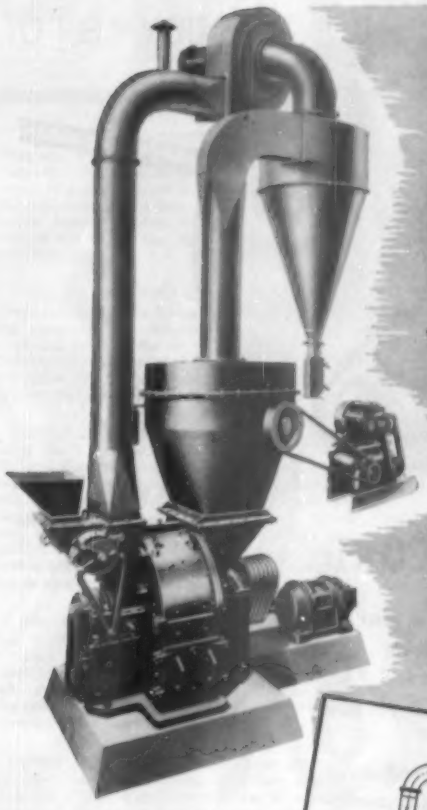
A field trip was made to the Henderson, Nev., operations of the U. S. Lime Products Co. Operations near Henderson of Manganese, Inc., and Western Electrochemical Co. were also visited. A third trip was to the rare earths operation at Mountain Pass, Calif., operated by the Molybdenum Corporation of America. Located near Mountain Pass on the Nevada-California highway and about 65 miles west of Las Vegas are huge deposits of the so-called rare earths. In the periodic table, 15 of these rare earths are listed and the Mountain Pass deposit contains 14. The deposit ranges from 10 to 65 percent "mixed metal" and is mined with open pit methods. The ore is a red-brown colored rock. A processing plant, using Marcy grinding equipment, Western Machinery Co., and Denver Equipment Co., and Galigher flotation machines are used to up-grade the raw rock. Barite is an important gangue material, and it is depressed by the use of soda ash, Orzan A, Ac Silicate and Emersol with the pulp being boiled at 200 deg. F. in steel tanks before sending the pulp to the flotation machines. The plant has a capacity of 140 t.p.d. and produces an excess of concentrates that are in the 72 to 90 percent range. The concentrates sell for 30 cents to $1.50 per lb. Up to 500 tons per month can be produced, which is considerably more than the market can use, so the owners are anxious to develop new uses. The concentrate is in the form of a 72 percent mixed metal bulk concentrate, yellow in color, and a 90 percent oxide, the latter being made from the former by roasting in an Edwards roaster. Wet concentrates are filtered on an Eimco disc filter.

Radio for Profit

At the session on open pit mining, J. G. Ivy, general supervisor, engineering section, International Minerals & Chemical Co. in his talk on "Planning a Radio System for Profit" discussed the system used at the company's Florida phosphate mines. The company has 35 mobile units in operation working on two radio frequencies. The first frequency ties together maintenance, mining, milling, and staff departments. Four spot networks, operated on a second frequency in the low power radio band, serve the communication needs of small working teams in the field.

The radio communication system in use at Ajo, Ariz., by the New Cornelia open pit was also discussed by John A. Lentz, Jr., mine superintendent for the Phelps Dodge Corp. The speaker outlined the advantages by the use of 45 mobile units with two radio transmitting frequencies in use. The mine produces 75,000 tons per day.

Blast hole drilling was discussed at the session and one large open pit copper miner reported savings in the 33 percent range by the use of 12-in. diameter holes. The larger holes were easier to load and there were less holes to take care of. Better fragmentation also resulted.



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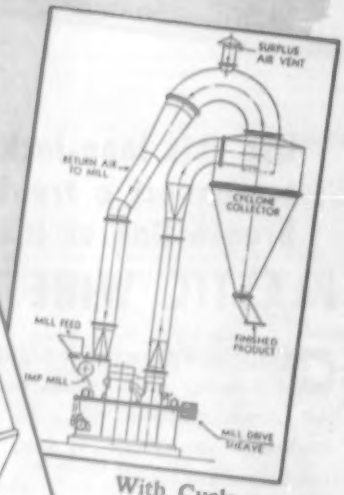

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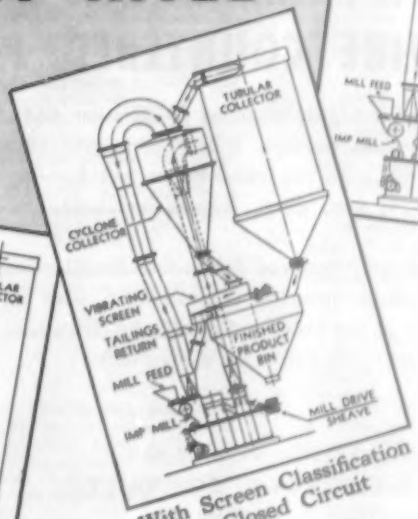

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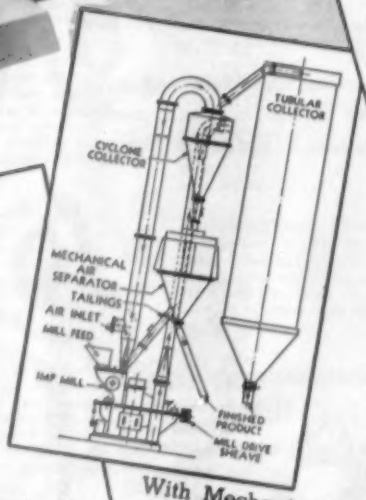

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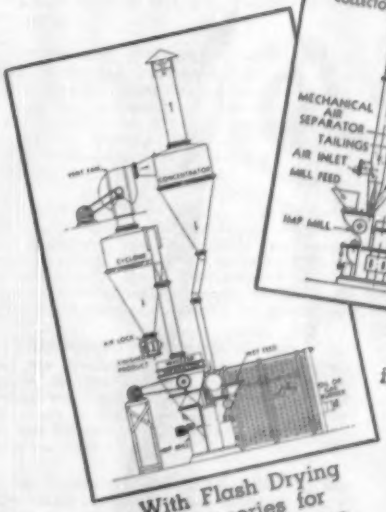

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1. Bend a figure eight (8) in the Plain or Reinforced Primacord trunk line. This will be your half-hitch.

2. Loop the end of the Plastic Wire Countered Primacord branch line and pass this loop through the figure eight as shown.

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4. Pass the free end of the branch line Primacord up through the loop as shown above. It can't slip off now!

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P-23

INFORMATION

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TO HELP YOU MEET TODAY'S PROBLEMS AND TO MAKE PLANS FOR TOMORROW

1 ASBESTOS SAFETY CLOTHING—Johns-Manville has issued a 12-page booklet entitled, "Asbestos Safety Clothing," describing various types of safety apparel including asbestos suits, helmets, aprons, leggings, overshoes. The Wearbestos line of gloves and mittens which are treated for oil, water and abrasion resistance are also described.

2 BELT CONVEYOR IDLERS—E. F. Marsh Engineering Co. has brought out a catalog giving data on the selection, application and mounting of its line of belt conveyor idlers. Included are a sectional drawing of the M14 troughing idler and bearing, dimensions, diagrams, and descriptions of mounting stands.

3 BUCKET ELEVATOR CHAINS — Beaumont Birch Co. has published a catalog, No. DC-855, describing and illustrating "Dura-Tread" chains and drive wheels for bucket elevators and conveyors. Types of available chains are listed along with various metals from which they can be made. Tables on the relative corrosion resistance and physical properties of the metals are included. Details on drive wheels incorporate pitch diameter, bore, and weight data.

4 CEMENTED CARBIDE BLANKS—General Electric Co., Carboloy Dept., has released a 20-page publication, No. ST-100, covering standard cemented carbide blanks for stone cutting tools. Included are prices, specifications, and data on masonry drills as well as grinding procedures for resharpening carbides.

5 CENTRIFUGAL PUMP — Ingersoll-Rand Co. has issued Form 7325, describing and illustrating a centrifugal pump classed as a paper stock and industrial liquids pump. Features, applications, and dimensions are given as well as a cross-sectional view and external view of the pump.

6 CONCRETE DURABILITY—The Master Builders Co. has announced a 20-page illustrated booklet giving owners' reports on the present day condition of concrete produced with Pozzolith, in structures ranging in age from 14 to 19 years. The importance of Pozzolith in obtaining concrete of low permeability and high durability is discussed.

7 CRAWLER TRACTOR — Allis-Chalmers Manufacturing Co., Tractor Group, Construction Machinery Div., has brought out Catalog MS-461, giving technical and operating features of the 45-d.hp. HD-6 diesel-powered crawler tractor. Included are photographs, specifications, and a list of matched equipment and accessories.

8 CRUSHING—Pennsylvania Crusher Division has announced a booklet containing two articles by Dr. Benjamin B. Burbank. The articles are entitled "Measuring the Crushing Resistance of Rocks and Ores" and "Measuring the Relative Abrasiveness of Rocks, Minerals and Ores."

9 DIESEL-POWERED CRAWLER TRACTOR—Allis-Chalmers Manufacturing Co., Tractor Group Construction Machinery Div., has released Catalog MS-457, describing the engineering, design and performance features of the HD-21 diesel-powered crawler tractor. Data is given on the 204-hp. diesel engine which powers the tractor, and a list of matched equipment and accessories is included.

10 DUST COLLECTORS — Omega Machine Co. has issued Bulletin 70-G1, describing and illustrating Omega dust collectors. Photographs, typical installations and dimension diagrams are given, as well as features and application data.

11 ELECTRIC LIFT TRUCK—Barrett-Cravens Co. has released Bulletin 551-3, describing and illustrating the Model PO-40 electric Hi-Lift platform truck for moving and stacking loads that can be carried on a platform. Specifications and features are included.

12 FLEXIBLE COUPLINGS — Philadelphia Gear Works has prepared a 12-page reference catalog describing the Spheraflex line of flexible, gear-type mechanical couplings. Complete dimensions and specifications, horsepower load ratings, and dimensional drawings are given.

13 FLOTATION PLANT—Denver Equipment Co. discusses the operation of an up-to-date flotation plant in an eight-page engineering notebook section from the September-October issue of "Deco Trefoil." A flowsheet, mill design study, and flotation equipment are also discussed in the issue.

14 FORK LIFT TRUCKS—Towmotor Corp. has released a booklet describing the advantages of automatic transmission for fork lift trucks. The design and construction features of the TowmoTorque drive are also described.

15 HEAT MACHINE—R. D. Pagael Co., Pagael Heat Machine Div., has brought out Bulletin LL-2320, giving specifications and application data on heat machine Models PW-189 and VO-168, both self-contained, oil-burning units. Illustrations are included.

16 HIGH-SPEED POTENTIOMETER — The Bristol Co. has released Bulletin P1270, describing the high-speed recording Dynamaster potentiometer. A full-size reproduction of a sample chart shows the dynamic characteristics of the potentiometer.

17 HOSE COUPLINGS — Titeflex, Inc. has issued a revised catalog on its Quick-Seal line of hose couplings. Cut-away views, tables, diagrams and a list of accessories are given. Also included are typical application photographs and a list of the company's regional sales offices.

18 INDUSTRIAL TRUCK—The Elwell-Parker Electric Co. has brought out a four-page folder detailing the major factors to be considered when specifying an industrial truck. A table lists 22 points to be used in evaluating the type of truck most suited to a given operation or operations.

19 INDUSTRIAL LIFT TRUCKS—The Yale & Towne Manufacturing Co. has published a four-color folder describing the EGA51 series of industrial lift trucks with Yale torque transmission. A "phantom view" presentation shows the internal features of the engine and transmission. The truck is built in capacities of 3000 to 8000 lb., and can be powered with gasoline, diesel or LP-gas engines.

20 KILN DOOR SEAL—Universal Door Carrier, Inc., has announced a folder entitled, "3 Corkers," describing the "Uni-Seal" Kiln door gasket, "Uni-Seal" rubber- to-steel cement, and "Uni-Coat" rust preventive coating. The three products are described in detail and prices are given.

21 LAB GLASSWARE WASHER — Labline, Inc. has announced a four-page brochure, No. 9100, illustrating and describing its "Power-Scrub" mobile laboratory glassware washer and accessories. Various models are listed, and features described.

22 LIMIT SWITCHES—General Electric Co. has announced an eight-page publication, No. GEA-6131A, describing and illustrating lever and rotating cam type limit switches. Application information, product features, ratings, dimensions, and book prices are given.

23 LUBRICATION—The Texas Co. has published Vol XLI No. 10 of "Lubrication," featuring an article entitled "Modern Oils for Modern Engines." Charts, photographs, and tables are given.

24 MAGNETIC DRIVE—Electric Machinery Manufacturing Co. has published Bulletin 4400-PRD-229, illustrating and describing the "Ampli-Speed" magnetic drive. Construction features are illustrated and pictorial drawings show the relationship of the drive to its magnetic amplifier control, the driving motor and driven load. Also listed are advantages, horsepower ratings, dimensions, speed ranges and speed control precision for variable and constant torque loads.

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25 **MAGNETIC PLATES**—The Homer Manufacturing Co., Inc., has issued Bulletin PL-250, describing and illustrating its permanent magnetic plates for automatically removing tramp iron from materials transported by pipes, chutes, belts and other types of conveyors. Application diagrams and performance data are given.

26 **MATERIALS HANDLING EQUIPMENT**—Syntron Co. has published a condensed catalog, No. 5510, containing 50 pages of technical data, brief descriptions and photographs of vibratory equipment, feeders, conveyors, power tools, shaft seals, diesel pile hammers, gasoline hammer drills, electric hammers and other materials handling equipment. Data is given on the complete line of all models of the equipment.

27 **MULTIPLE V-BELT DRIVES**—The Multiple V-Belt Drive & Mechanical Power Transmission Association and the Rubber Manufacturers' Association, Inc., have announced a 24-page revised manual of recommended "Engineering Standards Multiple V-Belt Drives." Copies are available at a cost of $1 each from either Rubber Manufacturers' Association, Inc., at 444 Madison Ave., New York 22, N. Y., or from Multiple V-Belt Drive & Mechanical Power Transmission Association, 27 East Monroe St., Chicago 3, Ill.

28 **PNEUMATICALLY PLACED CONCRETE**—Gunite Contractors Association has issued a brochure, No. G-55, containing 40 pages of illustrations and data on typical Gunite jobs. General information on the pneumatically applied concrete are given, as well as characteristics, recommended practice and general specifications. Gunite construction, rehabilitation work, channel lining, covering masonry or concrete and wood frame, and fireproofing are also detailed.

29 **PROCESSING EQUIPMENT**—Fuller Co. has issued Bulletin G-3, describing its line of equipment for processing industries. Photographs and schematic drawings illustrate the various Fuller-Kinyon conveying systems, Fuller rotary compressors and vacuum pumps, inclined grate cooler and preheater. Typical application photographs, tables, performance and capacities are included.

30 **QUARRY PLANTS**—Diamond Iron Works, Division of Goodman Manufacturing Co., has issued Catalog D-105, covering portable and stationary crushing and processing plants. Typical application photographs, specifications, flow charts, and descriptions are given.

31 **REFRACTORY CASTABLES** — J. H. France Refractories Co. has issued Bulletin 350, on its complete Hydrecon refractory castable line. A special section is devoted to mixing instructions, technical data tables are given for each product, and illustrations point out typical applications.

32 **RUBBER HOSE**—Thermoid Co., Industrial Rubber Division, has issued an eight-page catalog giving specifications and descriptions of 68 different rubber hose for industrial and agricultural use. Data is given on conveyor belts, flat power transmission belting, multiple and fractional horse-power V-belts, chute lining, rubber sheet packing and industrial friction materials. Twenty-three cutaway photos show hose, coupling and belt construction.

33 **SPLIT FLANGE TYPE HOSE FITTINGS**—Aeroquip Corp. has announced an engineering bulletin, No. 3, giving complete data on a recently introduced line of split flange type hose fittings. Available in straight, 45 and 90 deg. assemblies, the steel fittings are designed for use with Aeroquip single wire and double wire braid hose.

34 **SPRAY LUBRICATION** — The Farval Corp. has issued Bulletin 26-R, describing and illustrating "Spray Valve Panels," designed to spray-lubricate bull gears, girth gears, such as on grinding mills and kilns, and other spur or herringbone gear trains. Data is also given on other centralized systems of lubrication.

35 **STRIP-MINING EQUIPMENT**—Caterpillar Tractor Co. has brought out Form DE537, entitled "The Challenge," describing the applications of engines and tractors in strip mining. On-the-job photographs are included.

36 **SUSPENSION HOPPER SCALES** — The Webb Corp. has released a four-page folder on various types of suspension hopper scales used for mixing, proportioning or batching operations. A variety of styles and sizes are described and illustrated.

37 **SAFETY VISORS**—Mine Safety Appliances Co. has published a bulletin, No. 0302-4, describing and illustrating the Skullgard-Faceshield, for attaching to any M-S-A protective hat. The faceshield is made of a clear acetate for frontal and side face protection against abrasive particles, flying objects and chemical splashes.

38 **TRACTORS**—The Oliver Corp. has published Form A-950, describing Super 77 and Super 88 industrial wheel tractors. Performance data, advantages, specifications, and illustrations are included.

39 **TRACTOR-SCRAPERS**—Caterpillar Tractor Co. has released Form 31690, describing and illustrating the 300-hp. DW20 and DW21 tractors and accompanying Lowbowl-designed Nos. 456 and 470 scrapers.

40 **TRACTOR SHOVEL**—Allis-Chalmers Manufacturing Co. has announced Catalog MS-460, describing and illustrating the HD-11G tractor shovel. Engineering, design and production data are given, as well as specifications and various features.

41 **TRUCK-MOUNTED CRANE** — Bucyrus-Erie Co. has released Bulletin H-5-1, describing the all-hydraulic, truck-mounted H-5 Hydrocrane. On-the-job photographs, a four-page specification list, and features are included.

42 **TWO-STAGE PUMPS** — Allis-Chalmers Manufacturing Co. has prepared Bulletin 52B-6105C, entitled "Allis-Chalmers Two-Stage Pumps," describing the pumps for boiler feed and other high pressure applications. Dimension tables are given along with performance charts.

43 **TURBOCHARGED DIESELS** — Cummins Engine Co., Inc., has announced a 16-page, four-colored booklet on five "Turbodiesels," the 175-hp. JT-6; the 250-hp. NT-6; the 262-hp. NTC-6; the 300-hp. NRT-6; and the 600-hp. VT-12. The booklet describes the advantages of turbocharging, how it operates, and how it is applied to the diesel engines.

44 **VARIABLE SPEED TRANSMISSIONS** — Sterling Electric Motors, Inc., has announced a bulletin on Speed-Trol variable speed transmissions. Included are data on factors in drive selection and a description of the types of automatic and remote speed control accessories available.

45 **WATER BATCHER**—The Heltzel Steel Form & Iron Co. has published Bulletin E-18, describing and illustrating a semi-automatic water batcher for use in concrete batching plants. Included are operational details, features and line drawings pointing out two arrangements.

46 **WATER HOSE**—The B. F. Goodrich Co., Industrial Products Div., has issued an illustrated data sheet on its line of water hose. Included are descriptions of special hose constructions for specific uses. Sizes, pressures, coupling information and construction features for each type of hose are listed.

47 **WIRE ROPE SLINGS**—Union Wire Rope Corp. has published the 1955 Tuffy Sling Handbook containing 60 pages of illustrations, charts and diagrams describing 16 different factory-fitted slings and nearly 24 different standard fittings available for slings. A complete rigger's manual, shop chart of proof tested ratings, an engineer's notebook and standard signals for directing the operations of overhead traveling cranes, etc., are included.

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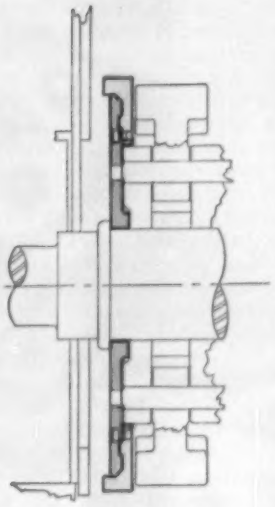
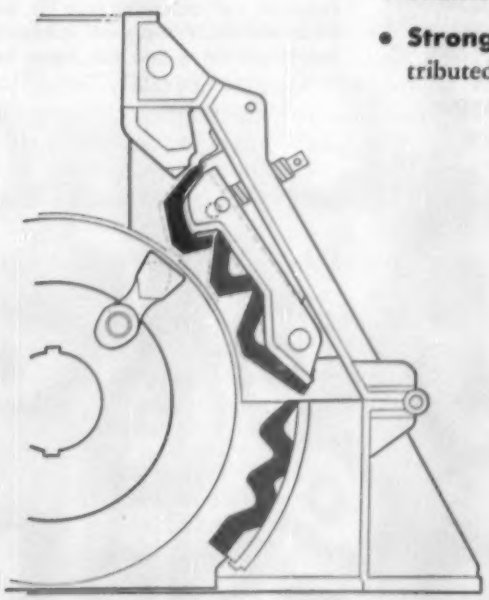


Showing renewable liners on end discs.

Pennsylvania originated the Impactor nearly twenty years ago and has been improving it ever since. Listed here are some of the improvements that you get in today's Pennsylvania Impactor, features that have been arrived at through constant on-the-job study and development by Pennsylvania's engineers and the cooperation of users.

- **Renewable Liners** on end discs are replaced when worn, instead of entire disc, reducing maintenance costs. Since liners rotate with the discs wear on end hammers is much less than if liners were stationary. Can be replaced without removing rotor.
- **Built-In Fly Wheel**—heavier discs on rotor give fly wheel effect eliminating need of external fly wheel.
- **Extra Heavy Shaft** not exposed to wear.
- **Oversized Antifriction Tapered Bearings** mounted on tapered section of shaft. Bearings are leveled and rest on a machined surface.
- **Frame** protected by liners over entire interior surface.
- **Stronger Hammers**—eyes designed after careful study of distributed stresses based on photo-elastic tests.
- **Adjustable Breaker Blocks** (pat. apld. for) keep product uniform and at maximum tonnage during entire life of hammers and blocks. Special design of Block contour gives maximum impact reduction—cubical product. No exposed fastening members.

Ask for bulletin that gives complete details of these and other features.



Dotted lines show adjustment range of breaker blocks toward hammer circle. Where needed bottom blocks can be made adjustable also.

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The diaphragm pump with the

10 MINUTE PARTS CHANGE

It can be opened, all wearing parts replaced, and the pump reassembled in a total of less than 10 minutes. Simplicity makes the Wemco Diaphragm Pump an operator's first choice among pumps for controlling and metering the underflow of thickeners, clarifiers and hydroseparators. It can serve anywhere for accurately measured pumping of thick solids at low head.

THE 10 MINUTE CHANGE

Removal of six bolts from slots around the bowl opens the pump.

Upper section of the bowl lifts. Removal of four cap screws releases the diaphragm from the plunger.

Reassembly is easy because the diaphragm is held by compression between upper and lower bowls. There are no holes to match.

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FLUXSTONE

(Continued from page 68)

stations. Emergency stop cords are also provided for all conveyors; these cords run the entire length of each conveyor.

Construction—Credits

Engineering details of the Cedarville plant were executed by Giffels and Vallet Inc. and L. Rossetti, Associated Engineers and Architects, Detroit, working in conjunction with the Michigan Limestone Division staff. Dismantling of the Thunder Bay plant and erection of new facilities, the dock, and rail line were handled by company personnel, many of whom are now operating the new plant.

In dismantling the old plant, the company established a system for marking all the structural steel and equipment in order to facilitate later reassembly. Different color paints were used for each building, and all numbers were painted yellow for easy identification. Most of the Thunder Bay plant was shipped the 100-mile distance by barge, since rail facilities to Cedarville were lacking and roads were of secondary nature. To facilitate the handling operation, railroad tracks were built down to the dock at each location. An ingenious method was devised for delivering the two 110-ton locomotives on barge from the company's Rogers City operation. The barge was moored along the dock at Rogers City and filled with ballast water until it rested on the lake bottom. A track was then constructed to the barge and each locomotive driven aboard under its own power. After the ballast water was removed, the barge was towed to Port Dolomite, where the procedure was reversed and the locomotives driven ashore. Most of the new equipment and steel was brought in by truck.

In reconstructing the steel buildings, the company used the tension-bolt method rather than rivets. This method was found to be easier and faster, little experience was needed, and it provided permanent tight joints with the bolts retaining their full clamping force. All buildings were enclosed with heavy corrugated steel sheeting.

Because the primary crusher was to be installed on the quarry floor, the quarry program was started simultaneously with plant construction at Port Dolomite. A considerable quantity of stone was excavated and stockpiled in order to provide space for erecting the primary crushing station. For driving the P-2 conveyor tunnel from the crusher to the surface, the company used two of its eastern underground mining experts, Norman Erickson and Richard Anthony. In order to fit the construction time table, the tunnel was constructed from the surface downward, rather than vice versa.

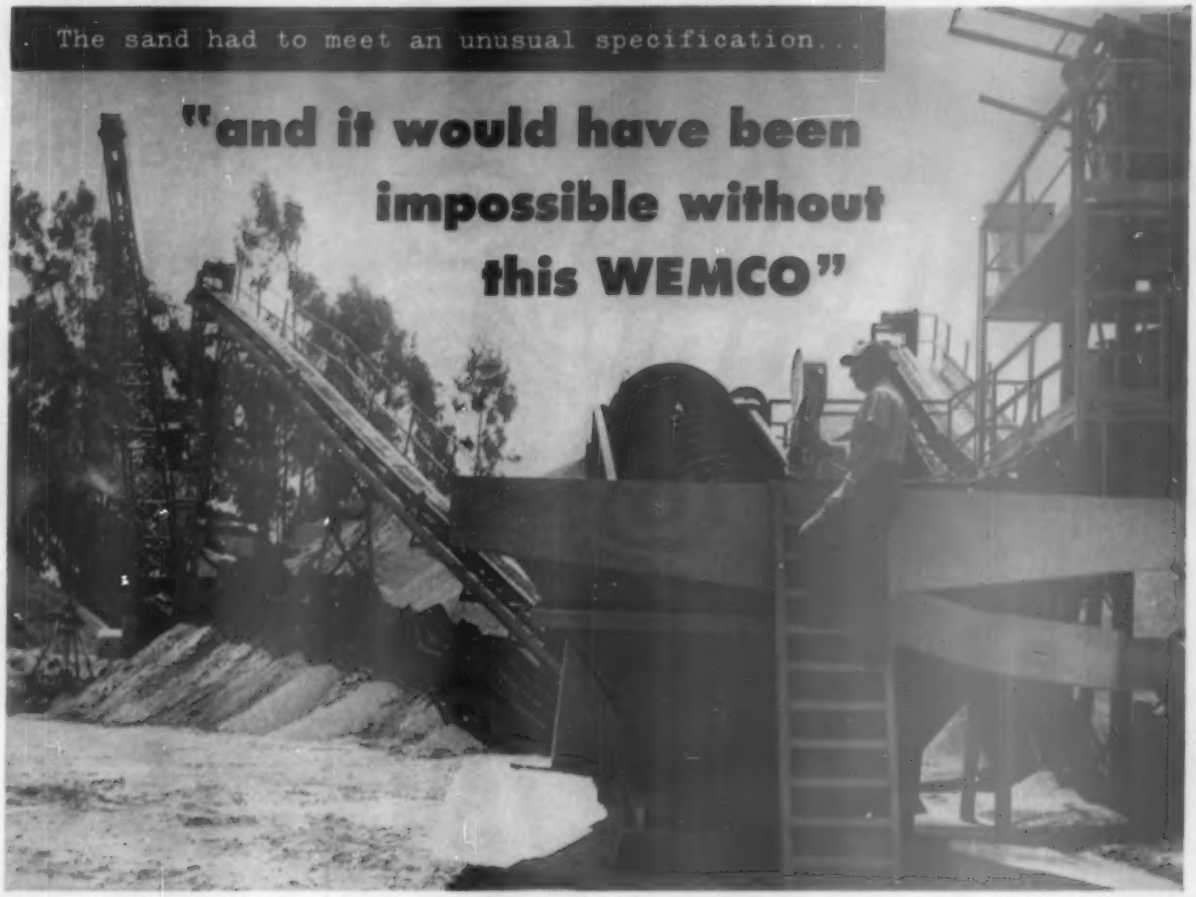
Erection of the stocking bridge is of interest. Weighing 400 tons, it was assembled on the ground and hoisted in place in one piece. Four hydraulic jacks were used at each end of the structure, and, following each lift, steel beam shoring was placed. Additional wooden cribbing and guy ropes held

(Continued on page 158)

Key Cedarville operating personnel. Standing, left to right: Ernest Bruning, quarry foreman; Lawson Macklem, maintenance foreman; C. R. Dolsen, plant manager; Gerald Burns, mill foreman; and Ivan Bannon, in charge of stores, stock and dock office. Kneeling, left to right, Edmond Schaedig, yard foreman; and Lewis Irvin, assistant plant manager at Cedarville

. The sand had to meet an unusual specification...

"and it would have been impossible without this WEMCO"



When the Niles Sand and Gravel Company got the sand and aggregate order for the Ford Motor Company's new assembly plant in Milpitas, California, it was on the basis of an exceptionally rigid sand requirement. It has now been successfully fulfilled, and H. G. Clouser, Niles plant superintendent, reports, "this would not have been possible except for the adaptability of our 60-inch Wemco Sand Preparation Machine".

With 60,000 yards of concrete being poured on this one Ford plant, the fineness modulus was not permitted to vary more than 0.2%. Plus 200 mesh fines had to be retained in correct proportion and – 200 mesh had to be eliminated as completely as possible. A continuous materials testing program was under the direction of Hales Laboratories of Oakland.

After his experience on these very exacting requirements, Mr. Clouser of Niles Sand and Gravel Company states, "I believe that the Wemco Sand Preparation Machine, intelligently used, can meet practically any desired sand specification." "It has proven particularly adaptable to various operational changes we have made." "The hydraulic screw lift makes it readily adjustable to day-to-day pit variations." "And it has been one of the most troublefree pieces of equipment in our plant (three years running on its original wear shoes)."

For descriptive literature, write Dept. J-2442.

Plant operator Tom Brannon using the hydraulic spiral lift. This simple adjustment compensates day-to-day pit variations, and in locations where freezing is a problem may also be used to break surface ice (eliminating the need for draining the tank for overnight shutdown).

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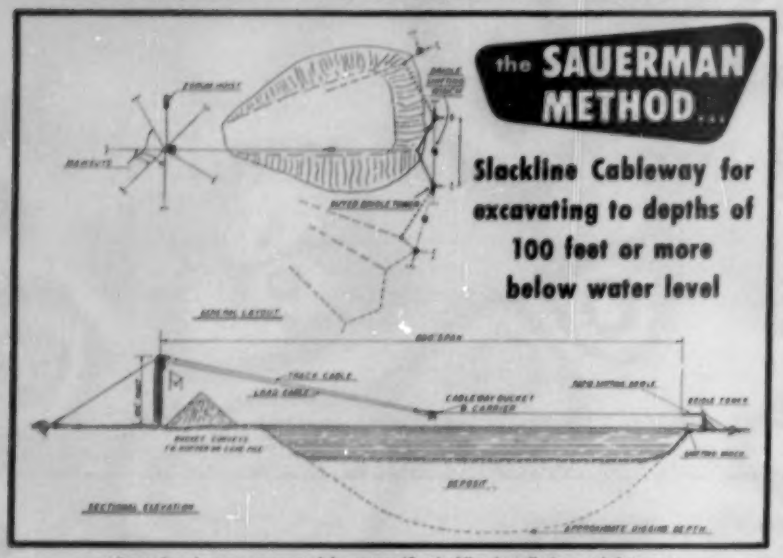
HOW TO GO UNDER WATER AND GET ALL THE MATERIAL FROM YOUR DEPOSIT


the SAUERMAN METHOD...
Slackline Cableway for excavating to depths of 100 feet or more below water level
SECTIONAL ELEVATION

Above drawing was prepared for a specific slackline installation and does not represent maximum spans. Rapid shifting bridle is not needed for many deposits.

Cableway at Cabinet Gorge Dam digs and hauls from tailrace 1000 ft. away. (Full details in Sauerman News No. 143.)

New York gravel producer switched to cableway for underwater operation of his pit. Average haul is 600 ft. from a 50-ft. depth (Sauerman News No. 141).

Deposits below water yield new profits with a long reaching Sauerman Slackline Cableway. On job after job this machine has proved to be the most efficient for this type of operation. It is especially effective where the material to be excavated has good depth and will flow to the bottom of the cut. For shallow deposits or non-caving material a rapid shifting device is used to change the line of operation.

One man controlling the hoist digs, conveys and elevates from deposit to plant over spans of 1000 ft. or more . . . across streams, lakes, bogs or deep pits. The powerful load line pull insures digging penetration. Tensioning the track cable lifts the bucket which is inhauled at high speed and dumps automatically. Gravity return completes the fast operating cycle. Bucket capacities range from ½ to 3½ cu. yds.

To get fast, economical long range excavation, and the shortest, most direct way from pit to pile use a slackline cableway. Contact Sauerman for specific recommendations. No obligation. Request Catalog C, showing detailed specifications and photos of slackline cableways in action on all types of deep digging jobs.

SAUERMAN BROS. INC.

630 S. 28th AVE. | BELLWOOD, ILL.

Crescent Scrapers • Slackline and Towline Cableways • Durolite Blocks

ROCKY'S NOTES

(Continued from page 31)

Also, the author explained how small inclusions of K_2O in certain portland cement compositions can have a very important effect on the amounts of C_3S and of C_2S that are formed in the clinker. He said: "The addition of only slightly more than 0.3 percent of K_2O to such a mixture reduces the potential percentage of C_3S to zero. With further addition of K_2O, free lime appears in the clinker. Sodium oxide is not as effective as K_2O in reducing the potential C_3S." That is particularly interesting because, according to Rankama's "Isotope Geology," calcium can be a decay product of radioactive potassium, so that the two elements are much more closely allied than sodium and calcium.

Another statement of general interest is: "During the process of manufacture of portland cement clinker, the alkalies and SO_3 may vary from kiln to kiln and even from time to time within the same kiln. These variations may occur as a result of the irregular return of the flue dust, of changes in the draft, the temperature of the kiln, composition of the fuel, etc., as well as changes in the composition of the raw mix. As a result of the variations the composition of the clinker may shift from one system to another. The potential compound composition of the clinker will be considerably altered by each change of system."

That seems to us to be a pretty fair argument why the usual chemical specifications for cement are hardly an accurate appraisal of its worth. It also accounts for the common complaint by ready-mixed concrete producers that cement often lacks uniformity, even when it all comes from the same mill. Where at times it is more uniform as on a seasonal basis, for example, in the spring of the year, shipments come mainly from storage, and it may be merely that a blend is thus obtained, while with shipments "hot from the mill" as in the summer season of large demand, the user gets the full effect of these variations.

Interstitial Phases

Dr. Herbert Insley, National Bureau of Standards, U.S.A., had a brief paper on "Interstitial Phases in Portland Cement Clinker." His concluding two paragraphs are: "From the cement manufacturer's viewpoint, it is possible that further study of interstitial phases in clinker is uneconomical. If, however, it is found at some future time that it is important to suppress the crystallization of MgO or of the interstitial aluminates, it may be worth-

HOW ABOUT MURPHY DIESELS FOR ROCK?

"Excellent," says
HAROLD S. BULLARD, Equip. Supt.
Amis Construction Co.

"We find these engines have exceptionally long life and give excellent performance with a minimum amount of attention."

● When we are asked about Murphy Diesels for tough rock service, we prefer to let an owner answer for us. Harold S. Bullard, Equipment Superintendent, Amis Construction Co., Oklahoma City, is well qualified to answer, too.

Amis Construction Co. bought their first Murphy Diesel years ago as original equipment on a shovel. Mr. Bullard says of this engine, *"We were very well pleased with the economy of operation and rugged dependability of this original Murphy engine and since that time have purchased other Murphys for heavy duty work in our vast operations. We now have them in use as power for rock crushers, generators, shovels and cranes."*

Here is one user's opinion. And the repeat orders remove any doubt as to his sincerity. But don't stop here. Ask other Murphy Diesel owners for their opinions, they are our best salesmen. Then ask your Murphy Diesel Dealer to show you how Murphy Diesel Power will fit into your operation.

MURPHY DIESEL

Heavy duty power
for rock crushing

Murphy Diesel Engines and Power Units are available in sizes from 96 to 264 H.P. Engine speeds are 1200 and 1400 rpm. "Packaged" generating units are available with capacities ranging from 64 to 165 K.W.

MURPHY DIESEL COMPANY
5315 W. Burnham St.
Milwaukee 14, Wisconsin
Sales, parts, service throughout the nation

333

That's the guarantee you get with **Norblo** Automatic Bag Type Arresters

By "constant" we mean what operating men *expect* it to mean when applied to dust collection — *no* loss of suction drop, *no* down time, *no* variation in capacity.

Norblo's unit compartment system, with automatically controlled progressive and cyclic bag cleaning maintains the full capacity for which the particular installation is engineered. Bag cleaning is easily regulated if dust loading rate should change. Only one compartment is cut out at a time for cleaning (and that for only a few seconds) by means of moderate shaking which insures long bag life. A small quantity of reverse air is used to prevent unwanted dust flow during shaking operation. Excess dust is dropped without destroying the desirable basic filter cake.

Profitable, consistent performance of Norblo automatic dust and fume collection equipment is demonstrated in hundreds of important installations. If you need this facility for production, for salvage, or for good housekeeping, ask Norblo engineers what they can do for you. Write for Bulletin 164-4.

The Northern Blower Company
Engineered Dust Collection Systems for All Industries
6408 Barberton Ave. OLympic 1-1300 Cleveland 2, Ohio

while to investigate the value for this purpose of small additions of such materials as the borates. The microscopic study of the interstitial material provides a ready means for assessing the value of such additions.

"On the other hand, from the point of view of cement chemistry, we have practically no equivocal answers to the problems of the constitution of the interstitial materials. We do not know what the material is which gives the pattern of cubic tricalcium aluminate. We do not know what gives the deepened pleochroism to the interstitial ferrite phase in the presence of magnesia. For one's scientific peace of mind it would seem that better answers to these questions would be valuable and not too difficult to attain." [Pleochroism means it shows different colors in different angles of light.]

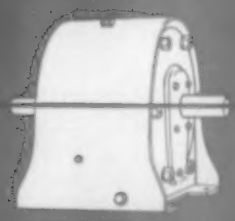
In discussing Dr. Insley's paper, T. W. Parker, Building Research Station, Great Britain, said: "The results of work on the compound composition of portland cement have made it possible to alter the composition in directions designed to produce desired properties in set cement. Obviously this may require alterations in raw materials, or in burning conditions, or in after-grinding.

"It is worthwhile noting that one way in which a marked change in mineral composition can be made without altering chemical composition, i.e., without adjusting the raw materials with such attendant changes in subsequent manufacturing conditions as may automatically become necessary, is by choice of the kind of cooling to which the clinker is subjected after attaining its highest temperature in the kiln. At the extreme ends of the possible choices, some 20 percent of the composition of the clinker may be made into a glass by rapid quenching, or may be made fully crystalline and in equilibrium with the remainder of the composition, by a sufficiently low rate of annealing. The proportion involved is so large that its possible significance should not be ignored, especially as the industrial processes involved even to produce the extremes do not seem to suggest undue practical difficulties."

Dr. W. C. Hanson, Universal Atlas Cement Co., U.S.A., made this comment: "On the line that Dr. Parker brought out, we do quench in a number of cements to do away somewhat with flash setting where we have tricalcium aluminate and also high magnesia. Where magnesia gets up to 4 or 5 percent we quench effectively to prevent expansion from the magnesia."

The practical difficulties in the whole subject of the study on the constitution of portland cement clinker were

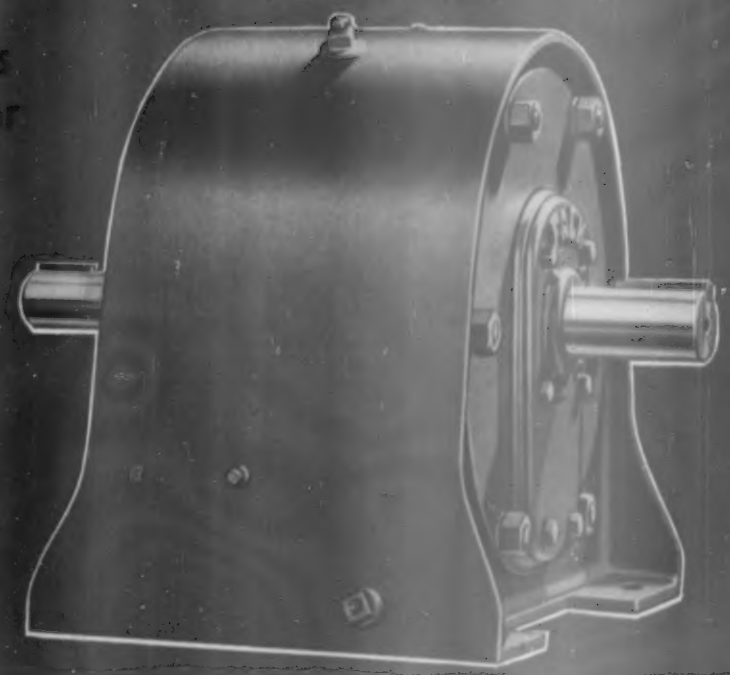
The versatile, STRAIGHT LINE—

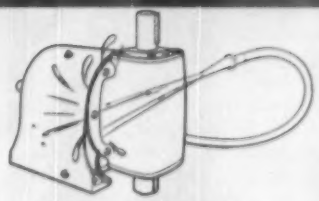


ALL-STEEL FALK SPEED REDUCER

(Concentric Type)

High and low speed shafts suitable for V-belt, gear or chain as well as coupling connections





The Type "C" Speed Reducer has these "In-built" Factors:

Sealed Housings. Dual closures and one-way vents keep oil in, dust and moisture out. Units are splash-proof, leakproof, dust-proof.

Positive Lubrication. Large sump capacity . . . oil-tight construction assures clean lubricant . . . direct dip of revolving elements provides positive lubrication at all speeds.

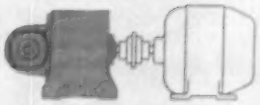
Precision Gearing. Heat treated alloy steel, precision cut and shaved helical gearing throughout . . . quiet-operating crown shaved pinions . . . taper bored gears for easy ratio changes.

Wide Speed Range. Selective ratio combinations provide output speeds from 1.5 rpm to 1430 rpm with stock gears.

All-steel Housings. Unbreakable, strong, rigid. Generous overhung load capacities provided by wide bearing spans, large shafts and bearings.

Streamlined inside and outside. Smooth, clean surfaces; machine welded construction conforms to NEMA motor frames.

A FEW TYPICAL DRIVES FOR "C" AND "CB" UNITS



COUPLING TO "CB" UNIT

V-BELT TO "C" UNIT

CHAIN TO "CB" UNIT

The ideal type for Turbine, Engine or Special Motor

Here is an exceptionally versatile member of the famous FALK line of reduction units. The Type "C" Straight Line Speed Reducer is an all-steel concentric shaft unit rated in accordance with AGMA standards. It is structurally similar to the universally popular FALK Motoreducer, and offers many special application advantages.

It can be driven by motor, turbine or engine with direct coupling connection—or through a V-belt or chain drive. It lends itself effectively to hydraulic coupling, brake-wheel or overload protective coupling, multi-speed transmission, or to variable speed drives—without modification. Units can include self-contained backstop if desired. Ratio can be modified with easily installed stock gears. With modifications, unit can be used as a speed increaser.

These all-steel Straight Line Speed Reducers are available for prompt delivery in standard ratios in horizontal and vertical concentric models, also in horizontal and vertical right-angle models; in single, double, triple and quadruple reduction. For full details, write for Bulletin 1104.

FALK . . . a good name in industry

THE FALK CORPORATION · 3001 W. Canal St. · Milwaukee 8, Wis.

THROUGH TRAFFIC *through* NAYLOR PIPE

You always have a "green light" when you use Naylor Spiralweld pipe for bringing fresh water in and carrying tailings out. This distinctive lightweight pipe is easier and more economical to handle and install. Uninterrupted traffic is assured by its exclusive lock-seamed, spiralwelded structure that provides extra strength and safety. Whether your operations call for water, for air, for discharge, for tailings, or for hydraulicking, you'll do better with lines of Naylor Spiralweld pipe. **Write for Bulletin No. 507.**

NAYLOR PIPE

NAYLOR PIPE COMPANY

1237 East 92nd Street, Chicago 19, Illinois

Eastern U. S. and Foreign Sales Office: 350 Madison Avenue, New York 17, New York

brought out in a paper by Dr. R. H. Bogue in which he outlined some of the methods that can be used to study, graphically, systems of four or more components.

The next installment of our review will cover the papers on the hydration products of portland cement.

Offers Course in Safety

TO MEET THE INCREASING NEED of industry for continued safety programs and practices, a new home study course in Industrial Safety Engineering has been added to the curriculum of International Correspondence Schools, Scranton, Penn. The course is designed to help industrial supervisors in charge of safety, industrial engineers who desire safety training, safety representatives of labor departments, and those whose responsibilities would call for a knowledge of safety practices in industry.

Comprised of 41 lessons requiring an estimated average study time of 650 hours, the course provides instruction in mathematics, machine sketching, blueprint reading, industrial psychology, handling of materials, plant and production equipment layout, and safety principles and practices.

The new course has been made available on the I.C.S. Selective Plan.

LABOR RELATIONS

(Continued from page 32)

single damages for these weeks total $114.13.

Conclusions of Law

"1. This Court has jurisdiction over the parties to and the subject matter of this action.

"2. During the work-weeks in which the plaintiff's activities related to the delivery and handling of form ties, and the production of sand for use on highways over which interstate commerce traveled, he spent a substantial portion of the work-week engaged in work in interstate commerce and in the production of goods for such commerce. This was conceded by defendants with respect to the work-week specified in findings numbered 16 and 17.

"3. With respect to the remainder of the work-weeks specified in the complaint the plaintiff has failed to carry the burden of proving that in each of them he was engaged for a substantial portion of each week in commerce or in the production of goods for commerce.

"4. Plaintiff was not exempt from the maximum hours and overtime provisions of the Fair Labor Standards Act as an employe of a motor carrier.

(Continued on page 150)

"We're very pleased with our AMSCO® PUMP. It's up to our tight production schedule . . ."

That's the report given by Captain James J. Murray of the Intercoastal Dredging Co., a subsidiary of Coral Ridge Properties, in Fort Lauderdale, Florida.

Captain Murray operates the dredge "Dade" which is helping to convert swampland into highly desirable real estate along the Intercoastal Waterway in Fort Lauderdale. This dredge, using a rotary cutter, cuts canals 115 ft. wide, from 700 to 1400 ft. long and at least 14 ft. deep at right angles to the waterway. Sand and coral rock spewed up by the cutter are sucked through the Amsco pump, along a pipeline varying from 500 to 2000 ft. . . . dumped to form valuable landfills.

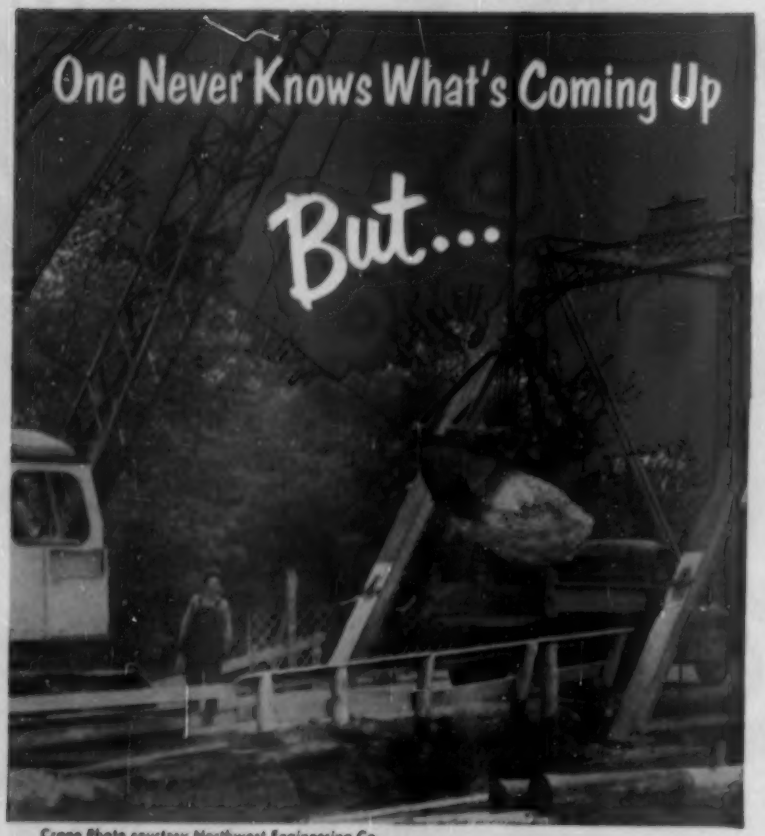
The Amsco pump averages 500 to 600 cu. yards of material (80% sand, 20% coral rock) per hour. More than ½ million yards of sand-coral mixture have been pumped since the 18" Amsco pump was installed. Intercoastal Dredging works on a tight production schedule, and that's why they are pleased with their reliable Amsco pump which keeps costly delays to a minimum.

In a normal 10-hour shift, the dredge "Dade" moves forward about 100 feet with its 18" Amsco pump working full time.

Whether your dredging operation is large or small, you can get an Amsco Dredge Pump to handle the job. Standard sizes range from 6" to 20" discharge openings. Larger sizes are also available. An Amsco Pump Engineer will be glad to discuss your requirements, or write for Bulletin 1052P giving full information and specifications on the Amsco line.

AMERICAN Brake Shoe COMPANY

AMERICAN MANGANESE STEEL DIVISION
Chicago Heights, Ill.



Crane Photo courtesy Northwest Engineering Co.

UP IT COMES
If it's an OWEN

Experienced contractors can determine with reasonable accuracy the general digging conditions they face, but they can hardly anticipate encountering unusual conditions such as illustrated.

If their digging equipment embodies the needed factors of extra power and strength, these problems are "taken in their stride" and the object is removed with out delay.

Owen, through long years of specialized experience, anticipates such difficulties in the design, engineering, and construction of their buckets. This is one of the factors that accounts for the dominant position that Owen buckets hold in excavating operations today.

Send for free illustrated catalog.

THE OWEN BUCKET CO.
6040 Breakwater Avenue • Cleveland, Ohio
Branches: New York Philadelphia Chicago Berkeley Falls, Fort Lauderdale Fla.

29 U.S.C.A. §213 (b) (1).

"5. Defendants are indebted to the plaintiff for overtime wages in the amount of $114.13, and an additional equal amount as liquidated damages, a total of $228.26. Said liquidated damages are awarded under 28 U.S.C.A., §216 (b).

"6. The court allows the sum of $75 to counsel for the plaintiff as a reasonable attorney's fee.

"7. Costs of the case are taxed against defendant."

An Explanation

IN OUR August issue, p. 51, we described an instance where an arbitrator decided that an employer (Virginia-Carolina Chemical Corporation) could not be held responsible for a traffic accident of one of its truck drivers. Our story was based entirely on extracts from the arbitrator's official report.

Apparently, this report, or the available extracts from it, made it appear to the employer involved that the uninitiated reader may get the impression adequate safety inspections or necessary safety instructions for operation of its equipment had not been provided.

If this impression was created we are sorry, for such was far from our intentions in giving space to the article. As is apt to be the case, it would appear that the arbitrator was somewhat biased in favor of the union, in spite of the fact that he could not justify a decision in its favor.

The employer involved has an enviable record for its safety measures and for its employe relations generally. There were evidently parts of the arbitrator's report that made acknowledgement of these facts, which we did not have access to.

The decision in favor of the employer is proof enough, however, of the justice of its position. The interest of the report to us, and we presume to our readers, is that an employer can not be held responsible for fines imposed on drivers in traffic accidents on a public highway due to careless operation of a truck, even though the brakes had become suddenly defective, since the driver knew they were defective, and should have been governed accordingly.

—The Editors

These Crushers Give Double Service!

Williams Heavy Duty Reversible Hammer Mill for top output of crushed stone, clay, shale and all other heavy abrasive materials.

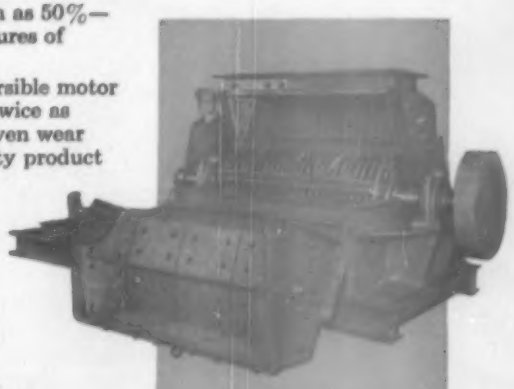
WILLIAMS *Reversible* HAMMER MILLS

Double service from hammers, breaker plates and grate bars—maintenance reduced to half or less—downtime cut as much as 50%—these are only a few of the money-making, time-saving features of Williams Reversible Hammer Mills.

Operation either clockwise or counter-clockwise with a reversible motor promises that hammers and other internal parts will work twice as long without even opening the machine. Slower and more even wear results in continuous peak output of a uniformly high quality product while, at the same time, demanding the very minimum of time and expense in the replacement of worn parts.

Reversible manganese breaker plates also give twice the usual length of service, and are adjustable to compensate for hammer wear to maintain original close settings.

For the most in real operating economy, high production and top quality products, get the facts about Williams Reversible Hammer Mills. *Write For Catalog.*



Open view of Reversible Hammer Mill. Note heavy shock-proof, wear-resistant manganese steel liners and breaker plates, and the rugged, reinforced construction. Entire interior easily, quickly accessible. Rotor removable without disturbing feeder or feed chute.

WILLIAMS PATENT CRUSHER & PULVERIZER CO.
800 St. Louis Ave. St. Louis 6, Mo.

WILLIAMS

CRUSHERS GRINDERS SHREDDERS

Impactors Hollx-Seal Mills Roller Mills Air Separators Vibrating Screens Feeders

OLDEST AND LARGEST MANUFACTURER OF HAMMER MILLS IN THE WORLD

AT GRAHAM BROS. CATALINA QUARRY

one intelli-Giant

UNCOVERED ENOUGH ROCK IN A FEW WEEKS TO KEEP OPERATION RUNNING A FULL YEAR!

"Excellent performance record," reports Graham Bros., even though their Intelli-Giant uses corrosive salt water from the nearby Pacific Ocean.

To mine a very steep bank, Graham Bros. first had to remove several feet of clay-laden soil, loaded with large boulders and thick brush growth. An Intelli-Giant was secured and set to work.

Operating at 160 psi and 850 gpm, the Intelli-Giant washed away burden and undercut boulders with such speed that in a few weeks enough rock had been uncovered to keep the operation running for a full year.

Interested in speeding up your quarrying operation? Then by all means investigate the Chiksan Intelli-Giant.

For more information write Dept. 2212

CHIKSAN

fmc CHIKSAN intelli-Giant

CHIKSAN COMPANY • *Subsidiary of Food Machinery and Chemical Corporation*
Brea, California • Chicago 3, Illinois • Newark 2, New Jersey
Well Equipment Mfg. Corp. (Division) Houston 1, Texas • Chiksan Export Company, Brea, Calif.; Newark 2, New Jersey, Chiksan of Canada Ltd., Edmonton, Alta.

ILLINOIS SURVEY

(Continued from page 80)

present markets and create new markets.

"Research can save a mineral which is losing its market," he said. "In 1930, 340,000 tons of fuller's earth were produced of which about 95 percent was used for the decolorization of mineral oils. Fuller's earth was displaced in this use by more efficient activated clays. Note that the new market for activated clays was also created by research. By 1951, shipment of fuller's earth for this use was down from 340,000 to 155,000 tons. But, total shipments were up to 490,000 tons because research had created new markets for insecticides, rotary drilling and floor sweep clays."

John W. Chapman, lieutenant governor of Illinois, Vincent Y. Dallman, editor of the Illinois State Register, and John C. Frye, who became Chief of the Survey in 1954, were the principal speakers at the anniversary banquet.

"And Now the Future," was the title of Dr. Frye's address. He said in part:

"The only conceivable answer to the needs of the next half century is a science and technology that progresses at a rate sufficient to keep pace with our expanding needs. In view of our present society and economy, it seems self-evident that the job before the Geological Survey and related organizations will be enormously greater during the next 50 years than it has been during the past. By this I do not mean to imply that there will be a radical change in the direction of the research program, but rather that there will be an intensification and a diversion of it."

Officials from other states attending the anniversary included: Dr. Olaf P. Jenkins, chief and state minerologist, Division of Mines, San Francisco, Calif.; Dr. Charles F. Deiss, state geologist, Bloomington, Ind.; Dr. H. Garland Hershey, state geologist, Iowa City, Iowa; Daniel J. Jones, state geologist, Lexington, Ky.; Dr. William C. Morse, state geologist, University of Mississippi; Dr. J. R. Van Pelt, director, Montana Bureau of Mines, Butte, Mont.; Prof. E. C. Reed, state geologist, Lincoln, Neb.; Dr. John C. Broughton, state geologist, Albany, N. Y.; John H. Melvin, chief, Division of Geological Survey, Columbus, Ohio; Carlyle Gray, acting director, Geologic Survey, Harrisburg, Penn.; Dr. Paul H. Price, state geologist, Morgantown, W. Va.; and Dr. George F. Hanson, state geologist, Madison, Wis.

On Wednesday morning, Oct. 12, visitors were taken on escorted tours of the Geologic Survey laboratories.

In New Jersey . . . And the World Over
Experienced Quarry and Mining Men Choose Bucyrus-Eries for the Really Tough Jobs

When digging is really tough, like in the solid rock at this northern New Jersey quarry, experienced men put a Bucyrus-Erie shovel on the job. The Bucyrus-Erie 110-B with 4½-yd. dipper on this job keeps a fleet of trucks busy maintaining a steady flow of rock to the quarry crushers.

The superiority of Bucyrus-Erie front-end design, extra-strong construction, Ward Leonard electric control and advanced engineering is recognized the world over. For that extra margin of performance that means higher output at lowest cost per yard, put a Bucyrus-Erie to work on your jobs. 64155

GLOBAL APPROVAL

UNITED STATES · VENEZUELA · ALGERIA · CANADA · CONGO · ENGLAND · FINLAND · FRANCE · INDO-CHINA · MOROCCO · PHILIPPINES · RHODESIA

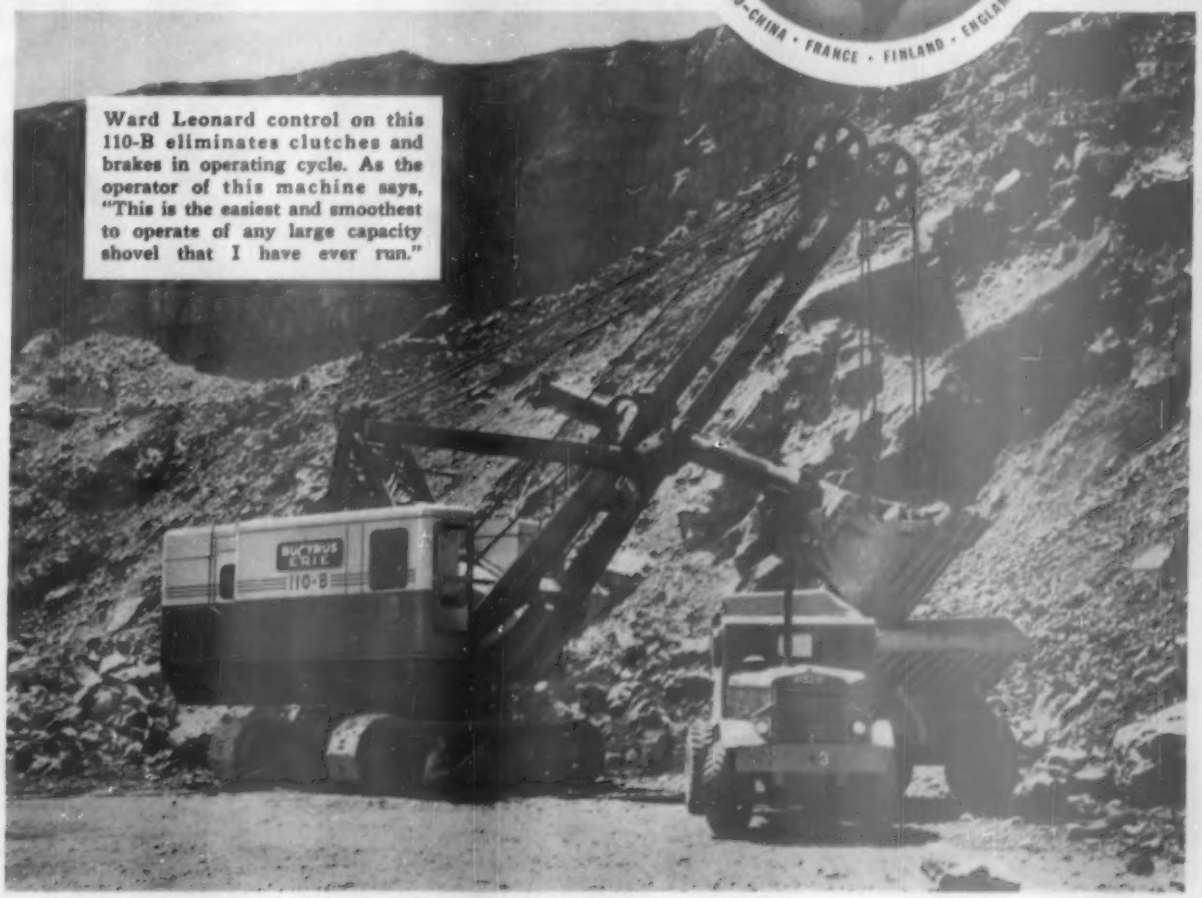
110-B 4½-cu. yd.
150-B . . 6-cu. yd.
190-B . . 8-cu. yd.

BUCYRUS ERIE

BUCYRUS-ERIE COMPANY

1880 South Milwaukee, Wisconsin **1955**

75 YEARS OF SERVICE TO MEN WHO SHAPE THE EARTH



Ward Leonard control on this 110-B eliminates clutches and brakes in operating cycle. As the operator of this machine says, "This is the easiest and smoothest to operate of any large capacity shovel that I have ever run."

FOR LOW COST HANDLING AND CRUSHING of ★ ROCK ★ ORE ★ SLAG ★ MINE REFUSE ★ LIMESTONE ★ GYPSUM and other materials

McLANAHAN
Heavy Duty
RECIPROCATING PLATE FEEDER

Built to handle materials from the size of sand to shovel-loaded rock. Rate of material flow automatically controlled. Quickly adapted to production capacity of any machine.

A combination of McLanahan Reciprocating Plate Feeder and Rockmaster Crusher is your answer to the most economical feeding and crushing of large tonnages of rock, ore, limestone, and other materials. Furnished as separate units or in combination as required.

McLANAHAN
Single Roll
ROCKMASTER CRUSHER

Here is the economical solution to the most rugged crushing applications involving primary or (secondary) reduction of shovel-loaded rock and ore. Special features include—high capacity, low headroom and many other distinct advantages.

Write Today
For Bulletins
RM-505 and FRE-4812

McLANAHAN & STONE
CORPORATION
PIT, MINE AND QUARRY EQUIPMENT HEADQUARTERS SINCE 1835
252 Wall Street, Hollidaysburg, Pennsylvania

S. AFRICA PHOSPHATE

(Continued from page 88)

South Africa. When large quantities will become available as by-products of other undertakings, it may become economical to process it.

Due to the fact that Foskor is situated in wild, uncivilized bush, 25 miles from the nearest railway and 350 miles from Johannesburg, production costs are naturally high. The corporation must of necessity be self-contained and a power station, and water pumping and purification plant had to be built. Housing for both European and African staff had to be built and various facilities provided to attract scarce labor. Only delays of any note have been caused by the slow arrival of cement. Factors not usually encountered in the establishment of an industrial undertaking had to be considered; for example, overhead power lines were elevated sufficiently to allow the passage of giraffes.

MODERNIZE PLANT

(Continued from page 92)

already mentioned, there is a 3-ft. Symons cone, a set of 24- x 54-in. rolls, and a 7-B, Newhouse reduction crusher. Symons screens are used on the wet side for the gravel and Allis-Chalmers Lo-head screens for the crushed rock.

Like other plants in southern California, the Sunland operation produces four types of sand; a washed concrete sand, a washed masons sand, an un-washed concrete sand and an un-washed masons sand. In addition to these products, some plus 30-in. jetty stone is produced at the pit, and finds a local market.

All material from the plant is trucked to market; no railroad serves the plant. At the office are two, side-by-side, sets of truck scales so that truck weighing is expedited. The asphalt operations operated by Mr. Akmadzich also use these scales. The gravel plant has a capacity of 450 t.p.h.

Jim Lo Monaco is superintendent of the Sunland operations of the Livingston Rock & Gravel Co., Inc. The company has provided him with a home adjacent to the plant. Mr. Lo Monaco was formerly with the company's Palos Verdes operation near San Pedro. The Livingston Rock & Gravel Co. also operates a sand and gravel plant in the Azusa area and has ready-mixed concrete plants strategically located in the Los Angeles-Long Beach marketing areas. Carder Livingston is president of the company, Howard Marsh, vice-president and production manager, and Ralph Wise, vice-president. The main offices are in Long Beach, Calif.

This Allis-Chalmers Crawler Tractor
MAKES A TIDY PROFIT
THEN LEAVES A TIDY LANDSCAPE

The marked trend toward land reclamation is placing more and more importance on the crawler tractor. For only the crawler tractor is flexible enough to pay its way through all stages of open pit operation.

Here, the Allis-Chalmers HD-16 proves to be a real efficiency expert as it demonstrates its usefulness both during *and after* an area has been worked.

Before production begins, the HD-16 strips and stockpiles overburden. If distance from pit to stockpile is too great for dozer operation, this versatile crawler teams up with a pull-type scraper for this initial job.

During mining operations, the HD-16 is always busy. It builds and maintains haul roads, feeds hoppers and conveyors, maintains stockpiles, skids heavy equipment, handles drainage problems, is ready and able wherever a push or pull is needed.

After the area has been worked out, the reclamation job begins. Overburden and waste, which have been stockpiled by the busy dozer, are now pushed into the pit and leveled off quickly. Reclaimed area can then be seeded for pasture, subdivided, or developed into some other form of usable land.

CONSTRUCTION MACHINERY DIVISION,
MILWAUKEE 1, WISCONSIN

ALLIS-CHALMERS HD-16

your choice of two outstanding drives

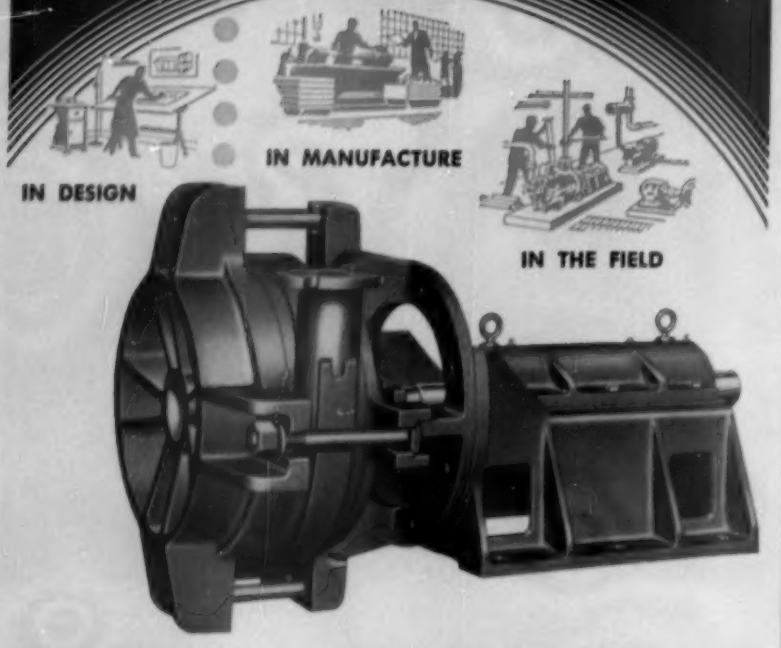
	Horsepower	Weight
Torque Converter Drive	150 net engine	31,600 lb
Standard Transmission Drive	131 belt	31,500 lb

plus new, longer truck frames, long-life track, straddle-mounted final drive, easier servicing . . . many other outstanding features.

Write for literature or get the full story from your Allis-Chalmers dealer.

ALLIS-CHALMERS

Culminating 91 YEARS of Experience —



10 Features Meet All Your HEAVY-DUTY Requirements!

- All-metal
- Large impeller diameters
- 4-bolt construction
- Extra deep stuffing box
- Renewable impeller liners
- Shaft and impeller hub thread sealed
- Easy access to packing gland
- Adjustable rotating element to take up wear
- Thrust bearing carries normal thrust only
- Heavy outboard radial bearing for high overhung loads

THE NEW MORRIS TYPE-RX SLURRY PUMP

Outgrowth of nearly a century of pump manufacturing experience, Morris offers you two invaluable extras when you specify new Type-RX slurry pumps!

1. *Full advantage of more than a lifetime of experience that Morris has had in the design, manufacture and testing of pumps.*

2. *Benefit from the vast experience that Morris has gathered in studying performance and efficiency records of pumps operating in every type of industry under the most severe conditions.*

A few of the features incorporated in the new type-RX slurry pump are listed here to give you an idea of how we have considered your every heavy-duty requirement. When you order this new Morris pump, it will be custom-made from any one of 7 sizes, 8 metals or alloys, and 16 nozzle positions to meet your *exact* requirements.

For more complete information on the new Morris Type-RX Slurry Pump, write today on your company letterhead, requesting a free copy of Bulletin 185.

MORRIS CENTRIFUGAL PUMPS

MORRIS MACHINE WORKS
Baldwinsville, N. Y.
Sales Offices in Principal Cities

SAFETY IDEAS

(Continued from page 128)

France Stone Co., Alpha Portland Cement Co., Portland Cement Association, Lehigh Portland Cement Co., the Funkhouser Co., Duquesne Slag Products Co., and The Warner Co. H. F. Johnston, safety director, The Funkhouser Co., Hagerstown, Md., was the narrator, getting assistance from representatives of various participating companies. Many of the ideas illustrated would fall into the category of "Hints and Helps" featured monthly in ROCK PRODUCTS.

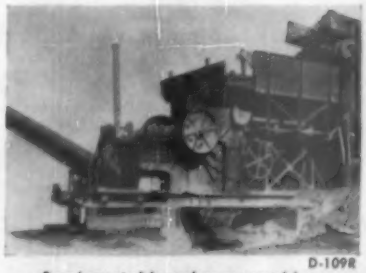
Among the many excellent safety ideas described were the following: green light at primary crusher to direct truck dumping; platform attached to conveyor framework for repairing conveyor belting; railing guard on bucket-type stockpile loader to protect operator; safety platform made from steel grating (with 8- x 8-in. openings) mounted inside of stone hopper; mirror at primary crusher hopper used by operator to facilitate dumping of quarry cars; plexiglass window instead of wire cloth to protect drop ball crane operator from flying stone; separate storage room for oxygen and acetylene cylinders, with U-shaped supports for holding tanks upright; and portable blasting shelter made from old asphalt tank, covered with metal roof and mounted on framework with four pneumatic tires.

Additional safety ideas included protection (blue) flag along railroad track to help switchmen; portable bailer rig (for cleaning out blast holes) attached to tractor-dozer; hinged portable platform used in repair of preliminator mills (before men got footing by standing on bolt ends); use of cold water and compressed air instead of live steam for cleaning cake on slurry filter; jackhammer drilling rig for drilling horizontal toe holes, which eliminates need for operator to work too close to quarry face; power-driven cable reel for handling power cable on electric shovel; oneway safety gates on stairs which make person stop and look before proceeding; aluminum rather than iron dock board used in loading bagged material into box car; use of vacuum system rather than air line for cleaning dusty clothes; motorized six-sided safety bulletin board which rotates slowly, and air-conditioned shovel cab for shovel operator working in slag pit.

The slide presentation was heartily received, and is expected to be a regular feature at future meetings. The Visual Aids Committee plans to publish a safety ideas booklet using these and similar illustrations. A plea was made for additional photographs.

D-439

How to get greater production at less cost in quarry operation



D-109R

Semi-portable primary crushing plant includes apron feeder, lattice frame under-crusher conveyor, and 24 x 36 jaw crusher using a double row of Timken bearings for both main and pitman bearing assemblies.

D-443

Diamond portable crushing and screening plant receiving material from primary plant.

First, define the conditions under which quarry equipment will be working: (a) what types of stone are present; (b) what sizes of finished material are to be produced, (c) what average daily or hourly capacity is required, (d) is washing to be part of the operation, and (e) what is the largest rock to be crushed.

Then match the abilities of proposed quarry equipment with each condition. For example, the Diamond primary plant shown above is designed for crushing extra large rock for feeding to crushing and feeding operations that follow. A smaller plant on this job, though lower in original cost, would be uneconomical in the long run.

Sounds easy . . . but there's a trick: how to find the *combination* of quarry equipment that will produce the most, cost the least. A Diamond engineer will gladly survey your site to help you determine how material can be best handled to produce the sizes and quantities required. He'll suggest a complete layout plan with sketches and specifications for necessary equipment. You incur no obligation for this service.

And . . . the Diamond equipment he'll recommend for your *balanced* quarry operation is the best available. New production records are being set daily by Diamond-equipped quarry plants. Write today for Quarry Catalogs D-105 and D-106 describing the Diamond line.

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FLUXSTONE

(Continued from page 140)

the bridge in place during the lifting operation. After the structure reached its proper height (50 ft.), steel supporting towers were erected.

Main operating personnel include C. R. Dolsen, plant manager (also project manager during construction); Lewis Irwin, assistant plant manager; Ernest Bruning, quarry foreman; Gerald Burns, mill foreman (also erection foreman during construction); Lawson Macklem, maintenance foreman; Ivan Bannon, in charge of stores, stock, and dock office; Edmond Schaedig, yard foreman; and Theodore Rose and Lyle Nye, loading and repair foremen.

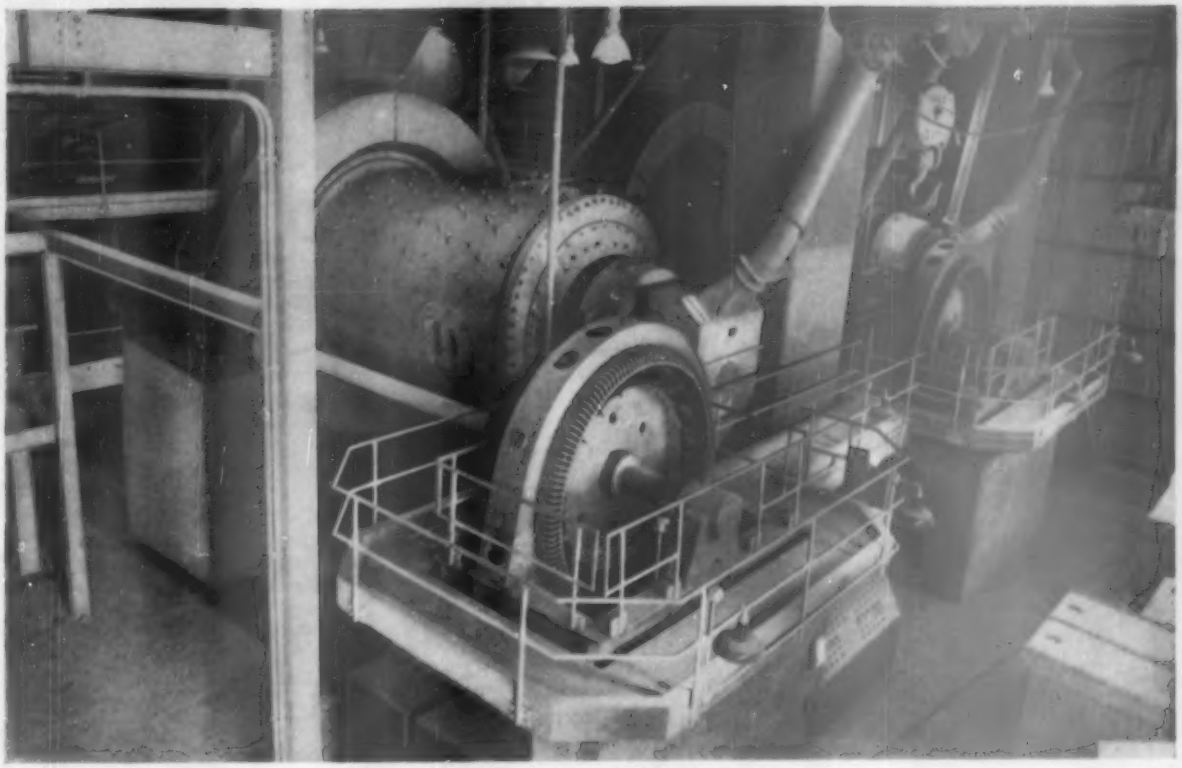
Michigan Limestone Division, with headquarters in Detroit, is an operating division of U. S. Steel Corp. Officers include C. F. Beukema, president; John Kinville, vice-president and treasurer; C. G. Hogberg, assistant vice-president; F. G. Corregan, purchasing agent; H. R. Baltzersen, comptroller; and T. C. Jackson, chief engineer.

The division is divided into Northern and Eastern districts. The former includes the Rogers City (Calcite) and Cedarville plants and the Bradley Transportation Line. J. A. Valentin is district manager and Lewis J. Patterson, assistant district manager and manager of the Rogers City plant. The Eastern district, under district manager J. N. Suliot, comprises the Annandale limestone mine at Boyers, Penn., the Kaylor limestone mine at E. Brady, Penn.; the Hillsville, Penn., limestone quarry; and the Moler dolomite quarry at Millville, W. Va. The division also operates two agricultural limestone plants, one at Buffalo, N. Y., and one at Conneaut, Ohio, which are under the direction of G. W. Mintz.

A.R.B.A. Convention

THE AMERICAN ROAD BUILDERS' ASSOCIATION will hold its 54th annual convention, January 11-14, 1956, at Miami Beach, Fla. United States Senators and Members of the House, as well as key officials of the Bureau of Public Roads and other Federal agencies, will discuss measures to improve the nation's streets and roads.

An exhibit of highway materials and supplies will be held at the Miami Beach Municipal Auditorium, where the convention is also being held. J. E. McCracken, sales engineer, Bethlehem Steel Co., and chairman of the executive committee of A.R.B.A.'s Materials and Supplies Division, and Burton F. Miller, division managing director, are in charge of the exhibit.



A Traylor Ball Mill Operator finds Grinding Costs Greatly Reduced

Not just one, but many, many producers have discovered new profits after turning their grinding operations over to Traylor Ball Mills. That's hardly surprising since everyone of these mills was "Traylored" to do a better grinding job . . . to assure a better product at less cost.

Traylor Ball Mills are fitted with a high pressure lubricating pump to coat the trunnions and "float" the mill as it's started. This overcomes high starting torques and undue wear caused by "dry" starting. The bearings are arranged for continuous self oil lubrication. Steel driving gears are precision cut with high and low addendum on a Maag gear generator. Shells are of heavy steel plate construction, automatically welded for thorough penetration and even flow of welding rod.

No matter whether you are grinding wet or dry materials, a mill can be "Traylored" to meet your individual needs . . . in practically any size. Have your mill "Traylor-Made" and you, too, will find grinding costs greatly reduced. For additional information request Traylor Bulletin No. 10-120.

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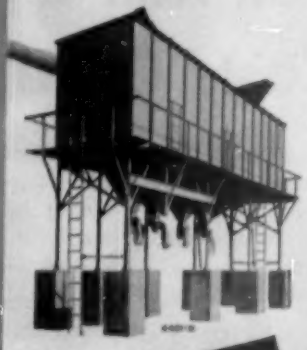

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KILN OPERATION

(Continued from page 72)

of clinker entering the heat recuperator, and this clinker is at a somewhat lower temperature than the clinker which had previously been entering it. This two-fold change causes a reduction in temperature of the combustion air, thus lowering the flame temperature and the temperature of the hot zone still further. The instability caused by the feed-back effect is again in evidence, but in the opposite direction. The over-all effect is to cause the kiln operation to follow an erratic and unstable course, in which periods of excessively high temperature are followed by periods of too low temperature. Each effort by the operator to return the temperature to normal, by change in kiln speed, actually accentuates the deviation, for a time. The cyclic movement either toward high or low temperature is terminated rather abruptly, and when compensation once begins, it generally proceeds too far. Skillful indeed is the operator who can maintain stable operation, through kiln speed control, of a kiln equipped with a really efficient heat recuperator.

Imposed upon the effects which have been described, and undoubtedly tending to accentuate them and often to obscure them, are certain phenomena related to the passage of raw feed from the feed end of a kiln to the burning zone. Whether from lack of close synchronization between kiln speed and feed rate, or other cause, periodic changes in kiln speed are frequently accompained by large changes in the progression of feed toward the burning zone. At one period much material may be entering the burning zone. At another period, a much smaller amount may be entering the burning zone. The important thing is that these amounts do not necessarily bear any direct relation to the kiln speeds at the times in question. It is of course recognized that in the wet process partly dried slurry may "hang up" in the chain section or other portion of the kiln near the feed end. However, the variation referred to is not confined to wet-process operation, but is also observed on dry-process kilns which have no chains and in which mud rings are of course not formed. The phenomenon is not well understood, and is usually extremely difficult to observe directly. Its presence can sometimes only be inferred from observations of the burning zone. Whatever may be the exact nature of this phenomenon, it is usually accentuated or perhaps caused by periodic changes in kiln speed and feed rate.

As the feed disturbances just dis-

(Continued on page 162)

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and

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THE CONVENTION AND EXPOSITION ALL UNDER ONE ROOF

Pangborn Dust Control

Saves $14,000 a year for Woodall

The Long Island plant of Woodall Industries, Inc., had a serious problem. Fabricating Masonite for its hundreds of products released so much dust that, without efficient dust control, work would be practically impossible. So Woodall installed a Pangborn Dust Control system.

The result? The dust collected not only leaves the plant dust-free but provides *all* the fuel for heating and processing requirements. Savings on fuel bills amount to $14,000 a year! Pangborn Dust Control at Woodall pays its own way *with a profit* for the firm.

Pangborn can solve *your* dust problem. Pangborn engineers will be glad to show you how Pangborn Wet or Dry Dust Collectors can save you time, trouble and money!

See how Pangborn benefits varied industries. Write for free copy of "Out of the Realm of Dust." Pangborn Corp., 4100 Pangborn Blvd., Hagerstown, Md. *Manufacturers of Dust Control and Blast Cleaning Equipment.*

Pangborn CONTROLS DUST

KILN OPERATION

(Continued from page 160)

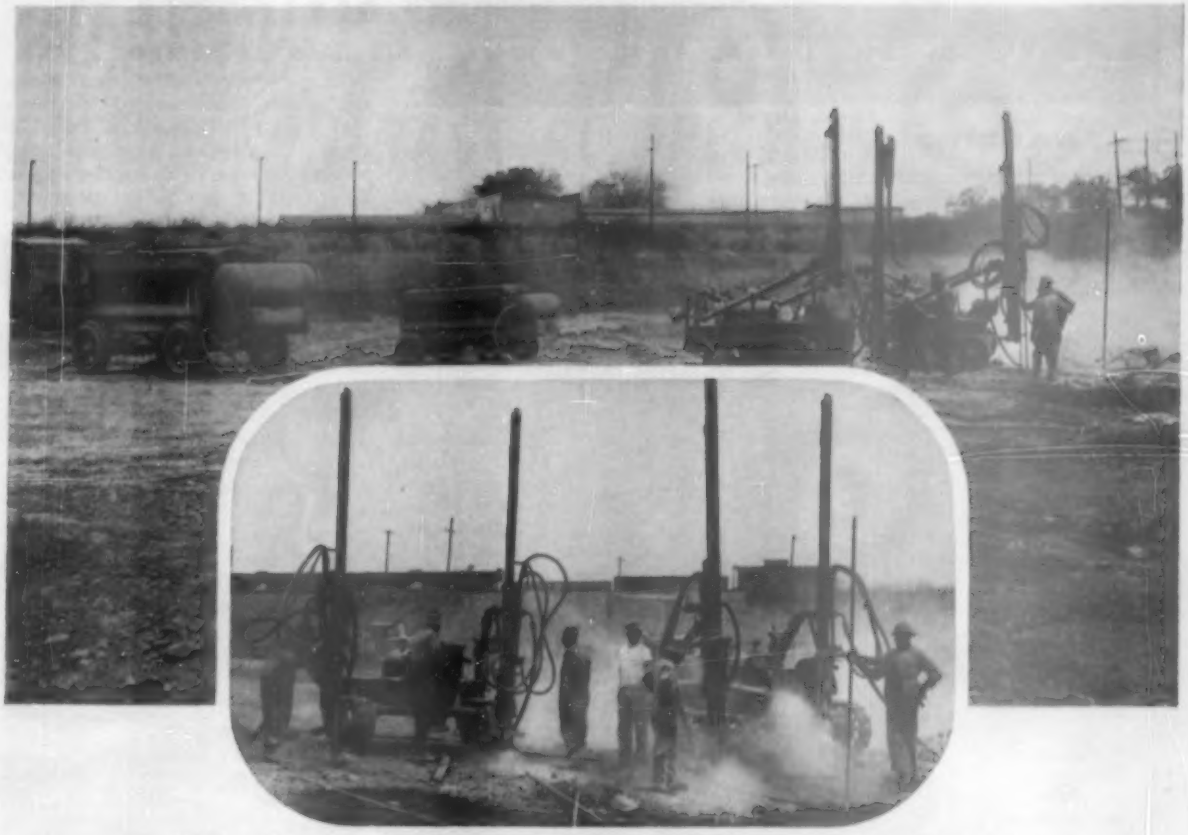
cussed originate at a part of the kiln far removed from the burning zone, the time of their arrival at the burning zone bears only a chance relation to the current kiln speed, or to the current temperature of the hot zone, or to the recent history of that temperature. Consequently they may act in such a way as to increase or to decrease the magnitude of those cyclical effects which have already been described and which arise basically from variations in the amount and temperature of the clinker entering the recuperator.

The periods of time involved in some of the cyclic fluctuations described are of interest. There appears to be no way of predicting the intervals, and in practice there is sometimes a wide change in the period from time to time from as little as, say, 15 min. up to a matter of hours. This will depend upon many factors, including the relative amount of heat recuperated, the extent and timing of the kiln speed changes made by the kiln operator, and the magnitude of the feed disturbances present.

Operate at Constant Speed

Most of the disturbing factors which give rise to unstable operation of kilns with recuperators are minimized by operating the kiln at constant speed, feeding it at a constant rate, and controlling temperature by regulating the rate at which fuel is fired. It is relatively easy to drive the kiln at constant speed, but it is not always easy to feed the kiln at a constant rate. Synchronized feeders do not necessarily accomplish this. Regulation of fuel firing rate as a means of temperature control brings its own set of problems, but it can be done, and is well worth doing in the interest of stable kiln operation. This method of control does not of itself induce long-period swings, and short-period cyclic action is reduced to a point that is not objectionable.

The principal way in which constant speed operation can contribute to stability is by making constant the rate at which hot clinker enters the recuperator. It should be noted that there are other influences which can cause considerable variation of the rate at which clinker enters the recuperator, even when kiln speed and feed rate are constant, but a discussion of these influences is beyond the scope of this paper. The important point is that a constant flow of clinker to the recuperator is highly desirable, and this cannot be realized practically if the kiln speed changes from time to time.



High Speed Sewage Disposal Team

Le Roi Compressors and Cleveland T-286 Mobile Drill Rigs provide flying start for Alabama project

Ordinarily you wouldn't think that air compressors and rock drills had anything to do with sewage disposal plants.

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The portables were Le Roi 600's. They were selected for their dependability and economy — which they proved by supplying 600 cfm of air — day in and day out.

The Cleveland T-286 Mobile Drill Rigs further cut costs. Basically the T-286 rig consists of a 25-hp tractor with two Cleveland patented air feeds, 4" drifters, and air-motor booms mounted on a specially-constructed front-end base. The booms swing in a 220 degree arc so that you can get any hole pattern you want. Because the T-286 gives you faster set-ups, better hole spacing, greater footage, faster drilling, greater mobility—because you can drive it anywhere and get better fragmentation — you get lower costs.

You get the whole story on Le Roi Portables and Cleveland T-286 Drill Rigs from our literature. Just write for your copies.

G-198

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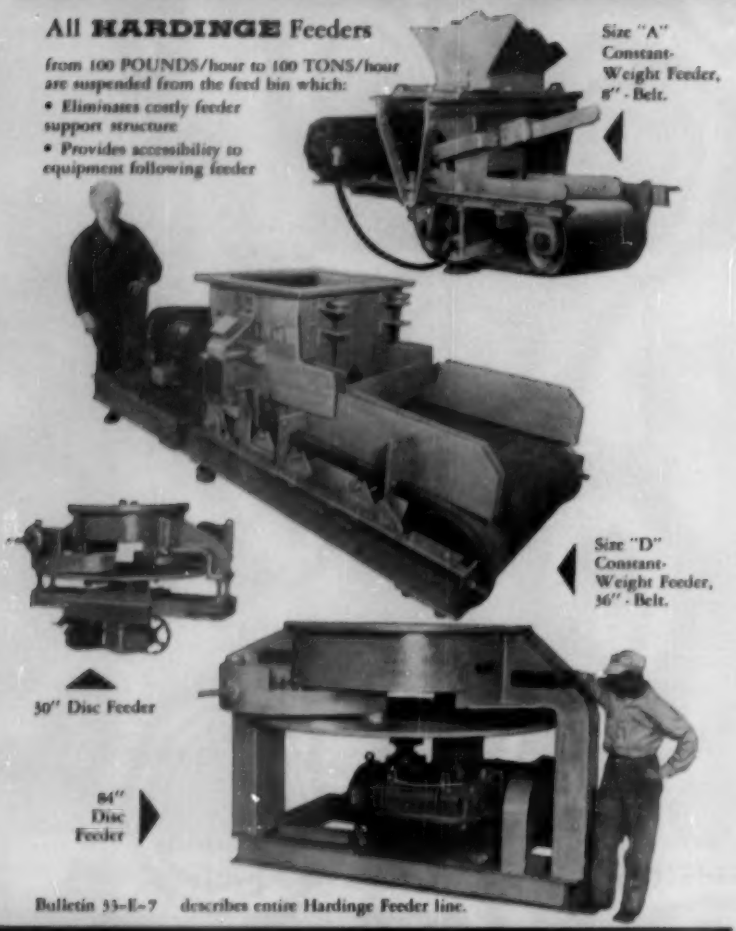

Bulletin 33-E-7 describes entire Hardinge Feeder line.

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SAFETY AWARDS

(Continued from page 130)

In the competition for plants working between 50,000 and 100,000 man-hours, the Fair Oaks, Calif., No. 111 plant of Pacific Coast Aggregates, Inc., was the winner, with an injury-free record over a work period amounting to 99,777 man-hours.

The Fort Jefferson, Ohio, plant of American Aggregates Corp., won the award in the group for plants working less than 50,000 man-hours. The plant had an injury-free record over a work period of 46,737 man-hours in 1954.

Each of the three winning plants will be awarded a trophy from ROCK PRODUCTS, at the N.S.G.A. convention in Chicago, February 13-16, 1956.

The following plants, excluding the three trophy winners, were awarded Certificates of Achievement in Safety by the National Sand and Gravel Association, for operating 20,000 or more man-hours injury-free during 1954:

Dolen dredge plant, Texas Construction Material Co., Romayor, Liberty County, Texas, 154,550 man-hours

Eliot plant No. 104 wet-pit, Pacific Coast Aggregates, Inc., Pleasanton, Alameda County, Calif., 136,284 man-hours

Marquette Sand and Gravel dredge plant, Marquette Cement Manufacturing Co., Memphis, Shelby County, Tenn., 136,111 man-hours

Flint Sand and Gravel wet-pit plant, Jahncke Service Inc., (Flint Sand and Gravel Co.), Bluff Creek, East Feliciana Parrish, La., 123,135 man-hours

Franklin dredge plant, Warner Co., Tullytown, Bucks County, Penn., 116,323 man-hours

Greenville dredge plant, Greenville Gravel Co., Greenville, Washington County, Miss., 96,542 man-hours

Quigley wet-pit plant, Hurst Gravel Co., Hurst, Tarrant County, Texas, 92,677 man-hours

Elgin dry-bank plant, The Chicago Gravel Co., Elgin, Cook County, Ill., 86,382 man-hours

Hudson dry-wet pit plant, Gifford-Hill and Co., Inc., Hearne, Robertson County, Texas, 82,555 man-hours

Boonville No. 1 dry-bank plant, Eastern Rock Products, Inc., Boonville, Oneida County, N. Y., 81,714 man-hours

Crystal Lake No. 388 dry-bank plant, Consumers Co., Crystal Lake, McHenry County, Ill., 81,203 man-hours

Centerville No. 106 wet-pit plant, Pacific Coast Aggregates, Inc., Centerville, Alameda County, Calif., 79,753 man-hours

Kerlinger No. 114 dry-pit plant, Pacific Coast Aggregates, Inc., Tracy, San Joaquin County, Calif., 79,360 man-hours

Nos. 9-10-11 dredge plants, Lyman-Richey Sand and Gravel Corp., Valley, Douglas County, Nebr., 60,842 man-hours

Nos. 5-6 dredge plants, Lyman-Richey Sand and Gravel Corp., Plattsmouth, Cass County, Nebr., 58,426 man-hours

West Des Moines dredge plant, Concrete Materials Co., West Des Moines, Polk County, Iowa, 57,362 man-hours

Cayuga dry-bank plant, Material Service Corp., Cayuga, Vermillion County, Ind., 56,503 man-hours

Alleyton No. 26 wet-pit plant, Texas Construction Material Co., Alleyton, Colorado County, Texas, 56,430 man-hours

Alleyton No. 1 wet-pit plant, Texas Construction Material Co., Alleyton, Colorado County, Texas, 54,680 man-hours

South Elgin dredge plant, Material Service Corp., Elgin, Lake County, Ill., 50,674 man-hours

No. 4 dry-bank plant, Janesville Sand and Gravel Co., Janesville, Rock County, Wis., 45,731 man-hours

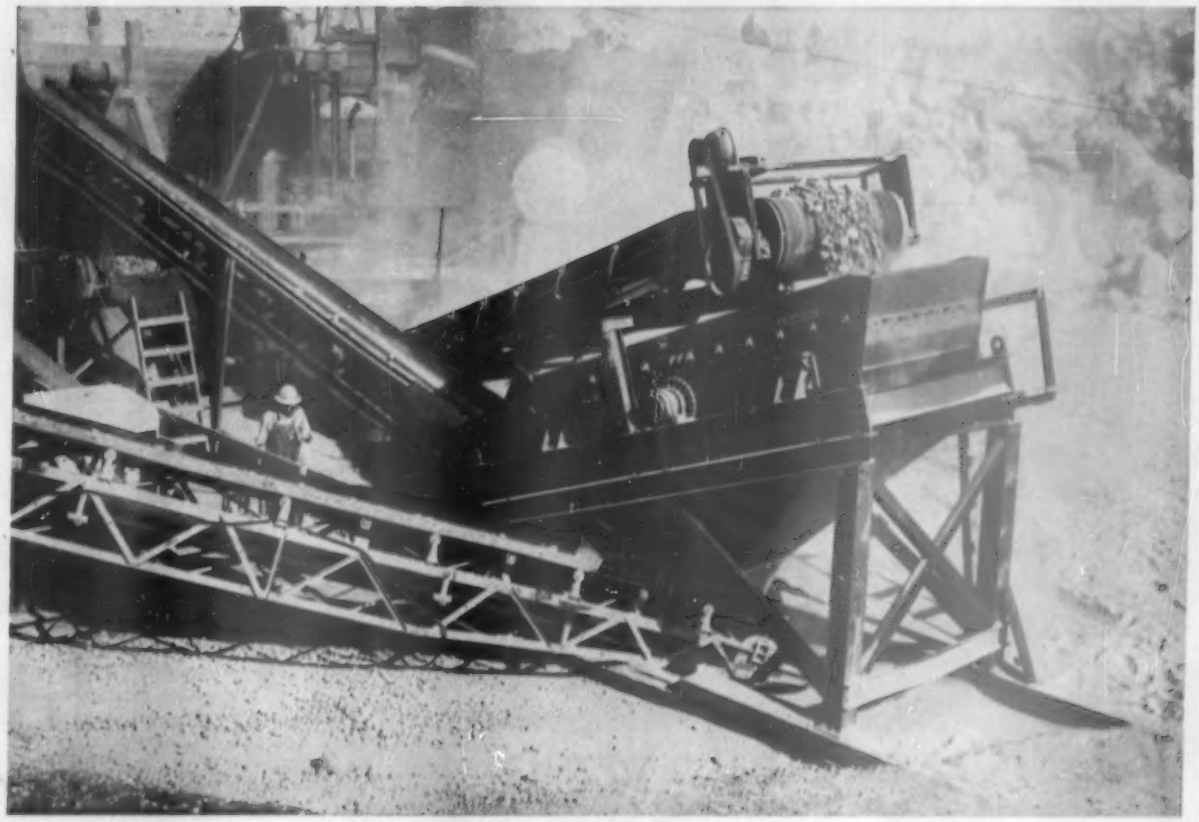
No. 5 dry-pit plant, Janesville Sand and Gravel Co., Janesville, Rock County, Wis., 44,540 man-hours

Northport dry-bank plant, Metropolitan Sand and Gravel Corp., Northport, Suffolk County, N. Y., 44,103 man-hours

Jere dry-wet pit plant, Southwest Construction Materials Co., Dallas, Dallas County, Texas, 42,946 man-hours

(Continued on page 166)

SIMPLICITY 5′ x 12′ SCREEN
SPEEDS CONTRACT COMPLETION FOR FREEWAY CONTRACTOR



Simplicity Model D 5′ x 12′ two-deck screen receiving volcanic rock from crusher.

BALDWIN CONTRACTING CO., INC., Marysville, California, utilizes this Simplicity Model "D" 5′ x 12′ two-deck Screen for sizing 2" material for highway base. Since April 14th 75,000 tons of tough, volcanic material have been handled by this Simplicity Screen. Operators all over the country are counting on Simplicity Screens where large-scale production of low-cost material is required. Simplicity units will increase production and will insure fast, accurate sizing in your Plant. The Simplicity simplified balanced assembly helps keep maintenance costs down. For complete information, consult a Simplicity sales engineer or write us today.

For further information on Os-A-Veyor Feeders, Conveyors, Gyrating Screens and Woven Wire Screen Cloth, write . . .

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For the screening of bothersome damp fines such as lime, ag-lime and silica sand, the NEW Model E Leahy Screen equipped with Flex-Elex jacket heating represents dependable economy far in advance of anything else in the field. Established and proved on the roughest, toughest fine mesh screening. Send for Bulletin 16-EH.

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Kingsbury wet-pit plant, Hurst Gravel Co., Euless, Tarrant County, Texas, 41,914 man-hours

Nos. 12-13 dredge plants, Lyman-Richey Sand and Gravel Corp., Fremont, Dodge County, Nebr., 41,443 man-hours

South Bend dry-bank plant, Western Indiana Gravel Co., South Bend, St. Joseph County, Ind., 40,285 man-hours

Rockfield No. 124 wet-pit plant, Pacific Coast Aggregates, Inc., Fresno, Fresno County, Calif., 35,944 man-hours

Eddyville dredge plant, Concrete Materials Co., Eddyville, Mahaska County, Iowa, 35,057 man-hours

No. 7 dredge plant, Lyman-Richey Sand and Gravel Corp., La Platte, Sarpy County, Nebr., 34,942 man-hours

Leesburg dredge plant, Western Indiana Gravel Co., Leesburg, Kosciusko County, Ind., 33,533 man-hours

Alleyton No. 21 wet-pit plant, Texas Construction Material Co., Alleyton, Colorado County, Texas, 33,470 man-hours

Fort Wright dry-pit plant, Union Sand and Gravel Co., Spokane, Spokane County, Wash., 33,367 man-hours

No. 2 dredge plant, Lyman-Richey Sand and Gravel Corp., La Platte, Sarpy County, Nebr., 32,041 man-hours

Falmouth dry-bank plant, Frederick V. Lawrence, Inc., Falmouth, Barnstable County, Mass., 31,517 man-hours

"A" dredge plant, The Buffalo Slag Co., Inc., Allegany, Cattaraugus County, N. Y., 30,085 man-hours

Alleyton No. 24 dry-pit plant, Texas Construction Material Co., Alleyton, Colorado County, Texas, 24,600 man-hours

Sussex dry-bank plant, Edw. Lutz Sand and Gravel Co., Sussex, Waukesha County, Wis., 24,153 man-hours

"AB" dry-bank plant, The Buffalo Slag Co., Inc., Alfred Station, Allegany County, N. Y., 22,046 man-hours

No. 15 dredge plant, Lyman-Richey Sand and Gravel Corp., Columbus, Platte County, Nebr., 21,782 man-hours

No. 23 dredge plant, Lyman-Richey Sand and Gravel Corp., Bridgeport, Morrill County, Nebr., 21,592 man-hours

Olympia No. 126 dry-pit plant, Pacific Coast Aggregates, Inc., Felton, Santa Cruz County, Calif., 21,481 man-hours

Waterloo No. 1 dredge plant, C. W. Shirey Co., Waterloo, Black Hawk County, 20,837 man-hours

South Bend dry-pit plant, South Bend Sand and Gravel Corp., South Bend, St. Joseph County, Ind., 20,426 man-hours

Bureau of Mines 1954 Safety Contest

THE U. S. BUREAU OF MINES has announced the winners of its 5th annual Sand and Gravel Safety Competition. The participating plants were divided into two groups, bank or pit operations and dredge operations. In the bank or pit group, the Eliot Plant No. 104, Pacific Coast Aggregates, Inc., Pleasanton, Alameda County, Calif., won top honors for the third consecutive year, with 136,284 man-hours in 1954 without a lost-time injury. In the dredge group, the Eagle Lake operation of Texas Construction Material Co., Eagle Lake, Colorado County, Texas, was the winner for the second consecutive year, with 162,200 injury-free man-hours in 1954.

A total of 77 sand and gravel plants or approximately 45 percent of those entered in the 1954 contest were operated during the year without a lost-time injury with 20,000 or more man-hours. Certificates of Achievement in Safety were awarded to the winner in each group, and each employee at the winning plant received a Certificate of Accomplishment in Safety. Certificates of Achievement in Safety were also awarded to each injury-free operation operated 20,000 or more man-hours.

1/3 MORE PAYLOAD

with REO F-506-M

14,000 lbs. 32,000 lbs.

Reo Tandems Scale 1½ More Yards Per Trip

The Reo F-506-M is designed and built specifically for mixer use. Engineered for a payload of 6 cubic yards of concrete—up to 1½ yards more than the average mixer chassis.

In addition to carrying 32,000 lbs. on the tandem axle, the Reo F-506-M is designed to legally carry 14,000 lbs. on the front axle. As much as 6000 lbs. more than other conventional type trucks.

Springs and axle, frame and tires, all combine to provide increased payload capacity. Power steering, which is standard, makes maneuvering easy under any conditions.

Reos, with their exclusive front axle payload design, place more load forward which means an extra 1½ cu. yds. of concrete every trip.

Remember, with Reos on the job, you can haul your regular daily volume with fewer trucks and fewer drivers . . . or you can increase your daily payload by 1/3 without increasing your fleet. Either way Reos make more profit for you.

100,000 mile or 1 year warranty on all Reo Gold Comet Engines. That's your assurance that—pound for pound—Reo offers you the greatest staying power, the greatest earning power for medium or heavy-duty hauling. Both the Gold Comet Sixes (107 to 160 H.P.) and the Gold Comet V-8's (195 or 220 H.P.)—gas or LPG—are available in rugged Reo chassis engineered to your job. Get all the Reo facts before you buy your next truck.

REO MOTORS, INC.

LANSING 20, MICH. • TORONTO, ONTARIO

SUBSIDIARY OF BOHN ALUMINUM AND BRASS CORPORATION

REO

WORLD'S TOUGHEST TRUCK

TRUCKS, BUSES AND GOLD COMET ENGINES FOR ORIGINAL EQUIPMENT, INDUSTRIAL AND REPLACEMENT—GAS OR LPG.

PROVEN RUGGEDNESS
for toughest crushing
Year in and year out you find more Farrel-Bacon crushers in really severe service than any other make on the market. When you examine these machines, you understand why.
The answer lies in the extremely simple mechanism and extra rugged construction of both frame and working parts. Also, Farrel-Bacon crushers, even after many years of the most abusive service, can always be brought back into first class condition, by re-babbitting, rebushing or truing up parts—at minimum cost.
Because they last so long, investment cost per year is exceptionally low.
Sizes: 60" x 48" to 10" x 7". Write for complete information or engineering assistance
FARREL-BACON
Ansonia, Conn.
BA-7

Slurries... handled at lower cost

The new WILFLEY MODEL K Centrifugal Sand Pump embodies important mechanical improvements especially adapted to the handling of cement slurry and results in stepped-up production and substantial power savings. Individual engineering. Write for details.

A. R. WILFLEY & SONS, Inc.
Denver, Colo., U.S.A.
New York Office: 1775 Broadway, N.Y.C.

Buy WILFLEY for Cost-Saving Performance

WILFLEY centrifugal PUMPS

KEEP ABREAST WITH INDUSTRY TRENDS THROUGH ROCK PRODUCTS

LIME CONVENTION

(Continued from page 166)

ing a 2:1:9 proportion for structural use. It is recommended that the cement and sand first be mixed and the lime then be added, using paddle-type mixers to require little re-tempering.

Lime for Paper

The outlook for the increased use of lime in paper manufacture is very good according to figures cited by Dr. K. A. Arnold, St. Regis Paper Co., New York, N. Y., in a talk entitled "The Chemistry of Paper."

He said that there were thousands of grades of paper manufactured today and that the annual use is 400 lb. per capita. Sales of paper totalled $8.7 billion in 1954, requiring $4 billion worth of raw materials which includes $2.5 billion worth of chemicals. The requirement is 500 lb. of chemicals per ton of paper and output of paper is 30 million tons annually. Lime is third in tonnage among chemicals required. According to Dr. Arnold the paper industry will double its chemical requirements in the next 10 to 20 years.

He discussed the various paper making processes and their utilization of lime. The sulfite process is on the decline and the sulfate process is the largest, totalling 10 million tons a year. In the conversion of sodium carbonate to calcium carbonate from 50 to 100 lb. of new lime are required per ton of pulp, with 400-500 lb. being recirculated. In the sulfite process, dolomitic lime is used in preparation of the cooking liquor.

Lime is used as a chemical bleaching agent in the manufacture of other papers and its use is considerable as a water softener. In the Jacksonville, Fla., plant of St. Regis, using 12 million gal. of water per day, 40 lb. of lime per ton of pulp are used for the purpose, none of which is recoverable.

(Continued on page 170)

Other foreign representatives were Eric Ahlstedt, International Ytong Co., Stockholm, Sweden, left, and J. C. Ortengren, American Ytong Syndicate, Vancouver, B. C., Canada

new 1½ yard BAY CITY . . . ideal for tough quarry work

In the quarry and on many other tough jobs, Bay City shovels are proving their honest dependability day after day. For instance, below is a new model #70, working for the Essex Sand and Gravel Company at Peabody, Massachusetts. This low-weight, low-price #70, rugged enough for quarry work, will handle any excavating job. Powered by Cummins Diesel with hydraulic coupling, the #70 as a shovel weighs 44 tons and is equipped with 23 ft. boom, 18 ft. sticks, and a 1½ yard rock-type dipper. Let us tell you more about this fully convertible shovel-crane which is available with standard or long crawlers. BAY CITY SHOVELS, INC., Bay City, Michigan.

WRITE FOR CATALOG 70/700-A

This 16-page catalog is yours for the asking. It tells the story of the 70/700 in pictures and text. Write for your copy today—no obligation.

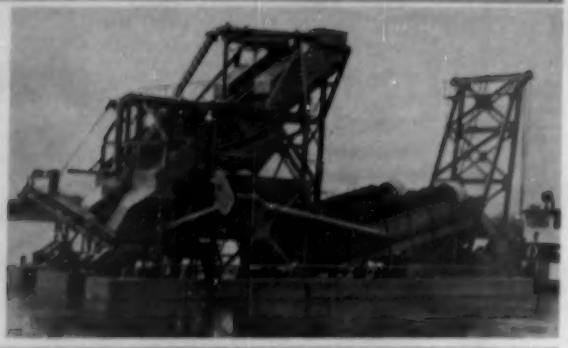
242

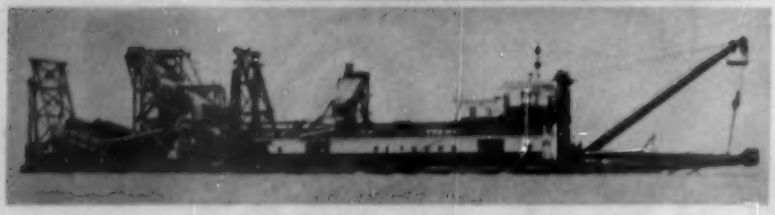
BAY CITY

BAY CITY SHOVELS, INC. • BAY CITY, MICHIGAN

SHOVELS • CRANES • HOES • DRAGLINES • CLAMSHELLS

AKINS Classifiers
washing oyster shell for cement





These 84" Akins Flared Tank Classifiers comprise one of many installations of Akins for washing oyster shell. This is typical of special applications where Akins excels in meeting exacting requirements at low cost.

Clean, high grade deposits of oyster shell are badly depleted and shell producers require washing equipment for processing low grade shell which is contaminated with mud and slime. Akins Classifiers have been their choice because they produce a cleaner product, handle large tonnage at low cost.

Akins Classifiers designed for oyster shell washing may be equipped with special scrubbing devices if additional washing action is required. The Akins Spray Water Box also may be added for difficult washing problems.

Akins—the ORIGINAL spiral type classifier.

COLORADO IRON WORKS CO.

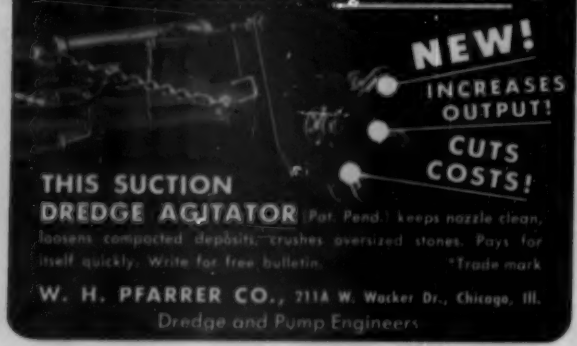
1624 17th Street • Denver 2, Colorado

AKINS CLASSIFIERS • SKINNER ROASTERS • LOWDEN DRYERS

Sales Agents and Licensed Manufacturers in Foreign Countries

A SUBSIDIARY OF THE MINE & SMELTER SUPPLY CO.

Have You Seen the AGIPELLER*?



NEW!

INCREASES OUTPUT!

CUTS COSTS!

THIS SUCTION DREDGE AGITATOR (Pat. Pend.) keeps nozzle clean, loosens compacted deposits, crushes oversized stones. Pays for itself quickly. Write for free bulletin. *Trade mark

W. H. PFARRER CO., 211A W. Wacker Dr., Chicago, Ill.

Dredge and Pump Engineers

KEEP ABREAST WITH INDUSTRY TRENDS THROUGH ROCK PRODUCTS

LIME CONVENTION

(Continued from page 168)

Pigments for coated papers also require lime.

The trend in paper manufacture is to more use of hard wood which yields improved printing paper, and to more coated papers for improved brightness and printability.

Quadrant Tile

Progress in the use of quadrant tile to improve the efficiencies of rotary lime kilns, as measured by fuel use, production and quality of product, was the subject of a talk by W. C. Burke and H. E. Primm of Harbison-Walker Refractories Co.

Until recent years, efficiency has been approached in many ways through improvements in cooling, burners, etc., at the ends of kilns but, said the authors, a growing interest in the application of internal methods to up efficiency has developed in the last 10-15 years. Kiln segments, dams and lifters have been devised for the mixing of kiln charges because of the weakness of rotary kilns that the hot gases stratify to the top of the kiln whereas the charge travels the bottom and is subject to size segregation with a tendency for the fine sizes to be embedded in the charge.

It was pointed out that quadrants are not new, having been patented as long ago as 1911 by John Jones, but that there is a revived interest due to high costs of operation and great demands for capacity. According to the speaker there are now some 30 rotary kilns for lime and the calcining of dolomite that have been fitted with quadrants, and they have resulted in varying degrees of improved efficiency. Most of them have been installed in the cooler, preheater sections of the kilns.

Slides were shown to illustrate some of the systems of installation in use. Thusfar they have been limited to kilns of 6½ to 9-ft. diameters, since the diameter will limit successful applications. The sections range from 15 to 30 ft. in length, as the optimum range based on experience, and they usually start 20 to 30 feet from the feed end of the kiln. Some start at the middle of the kiln and extend toward the feed end.

According to the speaker, the length and location of quadrants need more study and it may be that best results will be obtained if such sections are installed in both the middle of the kiln and at the feed end. Total length should not exceed 10 percent of the kiln length according to present experience which shows that no gains result from greater length but that

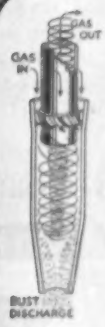
No wonder "MULTICLONE" is the leading name in the centrifugal recovery of dust from all types of gases, hot or cold.

No other mechanical recovery equipment has so many years of dust recovery experience behind it . . . or has such uniformly high collecting efficiency . . . or provides so many other money-saving, space-saving advantages as MULTICLONE. The four advantages outlined below are by no means the complete MULTICLONE story, but are typical of the vital savings found *exclusively* in MULTICLONE equipment . . .

In dust recovery

MULTICLONE COLLECTORS

***and only Multiclones* give vital advantages like these . . .**



Uniformly High Recovery:

MULTICLONE's multiple *small diameter* tubes—made possible by its exclusive vane design—whirl the dirty gases with greater centrifugal force, thus throwing out not only the large, medium and small particles, but also a high percentage of the *extremely small* particles of 10 microns and less. This, coupled with the fact that there are no pads or filters to become choked with recovered material, results in a more complete recovery of *all* suspended materials from the gas stream.

Space-Saving Compactness:

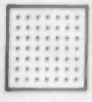
Plant space costs money—so be sure to check space requirements carefully. As shown in the accompanying chart, the MULTICLONE requires less floor space and less cubic space than any other unit of comparable capacity and performance. Translate these savings into today's high costs for plant space and you readily see the great importance of this one MULTICLONE advantage alone!

Make	Relative Space Requirements In Sq. Ft.	In Cu. Ft.
Multiclone	1.0	1.0
Collector A	2.1	1.0
Collector B	5.9	3.2
Collector C	6.8	3.9

Long and narrow

Maximum Adaptability:

In addition to its unusual compactness, the MULTICLONE is also unusually adaptable to various installation requirements. Where head room is low it can be installed with side-inlet side-outlet connections. Where side clearances are restricted, it can be installed with side-inlet top-outlet connections. In addition, without changing capacities, the shape of the unit can be varied—long and narrow, short and wide, or square—to fit restricted spaces . . . and its single-inlet single-outlet duct requirements permit greater flexibility and simpler installation. These savings slice installation costs, space requirements and insulating expense.



Square

Minimum Maintenance:

The MULTICLONE has no high speed moving parts to repair or replace . . . no pads or filters to clean or renew . . . nothing to choke the gas flow or increase draft losses as suspended materials are recovered. MULTICLONE draft losses remain uniformly low *at all times*. Further, the recovered material from an entire bank of tubes is collected in a *single* hopper—far easier to service and maintain than the multiple hoppers of conventional cyclone units.

FREE INFORMATIVE BOOKLET
This 32 page booklet outlines the basic principles of centrifugal dust recovery and shows the many ways MULTICLONE advantages assure higher recovery at lower overall costs. A free copy of this booklet will gladly be sent on request. Write today!

Before you decide on any recovery equipment be sure to get complete information on MULTICLONE advantages. A letter, wire or phone call to our nearest office places this information in your hands without obligation. Get all the facts and you will get MULTICLONE Collectors!

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NEFF & FRY BINS ARE DRY INSIDE

When we erected 17 bins for Johns-Mansville Corporation at Fort Worth, one specification was that the bins must show no signs of leakage or dampness after testing with direct impact of water through a standard fire hose nozzle. The bins are used for handling and storing slate granules of various colors for roof coverings.

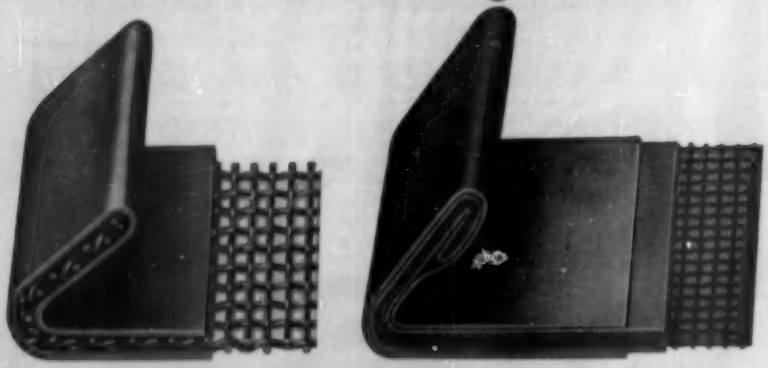
"The photograph indicates the water resistance of your bin which was tested in a most rigorous manner," wrote L. A. Benton, Johns-Mansville Project Engineer. "The installation has been very satisfactory."

No matter what kind of flowable bulk materials you use, you'll exercise good judgment by selecting our bins. Better ask for our folder, "Bins With the Strength of Pillars."

THE NEFF & FRY CO. • 280 Elm St. • Camden, Ohio

SUPER-CONCRETE STAVE STORAGE BINS

Tyler Screen Sections for All Makes of Screening Machines!



Screen sections of Tyler Woven Wire are fabricated for all makes of vibrating screens in any mesh or metal. They are made up with hook-strip or bent-edge construction to suit the machine on which they are to be used.

Tyler hook-strips make possible stretching and maintaining the screening at drum-head tension, which is essential for successful screening and long screen life.

THE W. S. TYLER COMPANY

CLEVELAND 14, OHIO

Manufacturers of Woven Wire Screens and Screening Machinery

figure may be increased if two quadrated sections be used.

In present installations fuel savings vary considerably. One company reports an increase of nine percent in fuel efficiency, whereas others report production increases of 15-25 percent. A 10 percent reduction in fuel and 10 percent increase in production are representative of average gains. Average life expectancy of quadrants is about one year.

Quadrated tile are subject to a cantilever effect and tend to move down the slope so much of the effort has been to improve installation methods. Kiln shells must be in good shape, first of all, for an installation to last. Various designs were shown as tried for structural reasons. Some of them tighten themselves as they try to move down the kiln. Usually high and super duty brick are used.

Blasting Claims

One of the most serious problems to confront the entire rock products industry in recent years was discussed by Lee McMahon, Mississippi Lime Co., Alton, Ill., in a talk entitled the "Problem of Insurance Reimbursement for Blasting Claims." "Subrogation," as the practice is sometimes called, has to do with the practice of insurance carriers paying damages for claims to homeowners for alleged damage due to blasting and then seeking to collect from quarry operators.

Mr. McMahon has been one of the leading figures in defending the industry against these unjust demands and in the charting of a course of action to prevent continuance of the practice. His company's operations have been the scene of studies which have contributed to a program whereby the industry is well on the road to adequate protection against the practice through an educational program with the insurance carriers.

In his company's case, a supply of limestone had been exhausted and the only available new source was 1000-1500 ft. from a section with 700-1000 homes. Extremely small blasting charges and millisecond delays were adopted in blasting and, for a period of 18 months, there were no complaints. Some 40 trains daily in the area created more movement than from blasting and, in addition, supersonic planes operated in the area as well as the large plant of Western Cartridge Co.

After 18 months some 200 claims of $1000-$1500 each for redecorating, etc., were filed by homeowners for alleged damage to their homes. The cartridge company paid off and the company settled some claims. The insurance companies did not want to

Mr. Wm. Pfeiffer
Crystal Lake Trucking and
Excavating Co.

"Averages More Than 2 Yds. Per Load with 1¾ Yd. PAGE AUTOMATIC BUCKET"

loads 15 ton trucks in 95 to 105 seconds

Mr. Wm. Pfeiffer of the Crystal Lake Trucking and Excavating Company knows that in his business "Lost Time Means Lost Dollars."

That's why his machine is equipped with a Page RM Class Automatic Dragline Bucket . . . the bucket that will dig faster, dump cleaner and produce more yardage per rated capacity than the ordinary old style dragline bucket.

> "Our trucks are averaging 32,000 to 34,000 pounds per trip and are being loaded in 5 bucket loads. At 3000 pounds per yard, that's over 2 yards per bucket with a 1¾ yard bucket and each cycle averages about 24 seconds" says Mr. Pfeiffer.

When your machines are equipped with Page Automatic Dragline Buckets, they will produce more yardage with less wear and tear on the machine and operator PLUS increasing the productive working time of every haulage unit they serve.

Why not investigate the advantages Page Automatics can bring you? We'll put a Page on your machine and prove to your satisfaction that it outperforms any other dragline bucket. Write, asking for details and Bucket catalog GPB 454.

Page Engineering Co., Clearing P. O., Chicago 38

Page

Automatic Dragline Buckets
Walking Draglines

Use REMA to add years of life to your Belts

REMA is the New and Amazing Self-Vulcanizing Rubber Repair Material

REMA REQUIRES
- NO HEAT
- NO HEAVY EQUIPMENT
- NO CURING TIME DELAY

• REMA is not just another cold patch. REMA is vulcanization by chemical process. The repaired area is sealed with an abrasive resistant cover stock patch. No heat or heavy vulcanizing equipment required. Here's the astonishing advantage—*when repair work is completed belts may be returned to service immediately.*

• REMA seals out moisture, reduces mildew, rot and deterioration — the great enemies of conveyor belts. Your own maintenance man can quickly repair your belt — it doesn't take a skilled belt mechanic to use REMA.

• Used for repair of all types of damaged spots, edge wear and for covering metallic joints. Available in introductory kits or parts separately.

Order from your Flexco-Alligator distributor

Write for Folder No. R4

FLEXIBLE STEEL LACING CO.

4684 Lexington St., Chicago 44, Ill.

REMA SELF-VULCANIZING RUBBER REPAIR MATERIALS

listen to facts concerning blasting control and all cracks in walls were attributed by them as resulting from blasting. Homeowners had fire insurance with extended coverage.

Mississippi Lime Co. was faced with $300,000 in liabilities through the practice of insurance carriers settling the claims through adjusting companies. The company had conferences with insurance carriers in Chicago and New York but they did not want to recognize the reports on blasting operations which the company submitted as evidence of control of blasts. Finally, the National Board of Fire Underwriters was prevailed upon to send officials to the quarry, and seismologists, dynamite men and crushed stone experts were present to witness tests of blasts. The result was appointment of a committee from the industry to meet with the insurance industry, and thinking has been revised so that carriers no longer just pay out damages in the face of claims. Instead, factual data substantiating that blasting may be and is being controlled for vibration control within safe limits are given recognition.

The principal concern has been that insurance companies have been quick to blame the industry for alleged damages, have paid on claims and then sought payment from quarry operators.

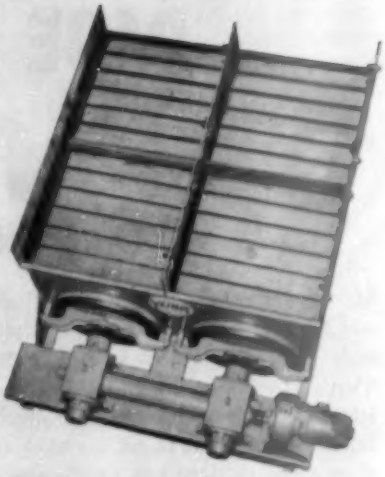
As a result of industry effort, instructions are to be gotten out to guide adjusters giving recognition to the fact that modern blasting practices result in control of blasting vibrations. The goal is to obtain statutory changes in the state laws like those in the New Jersey and Massachusetts standards which have sound basis.

Mr. McMahon suggested a course of action, should a subdivision be started near a quarry or a new location be opened near residential areas. His first suggestion is that the first claim for damages not just be paid on the face of the complaint. A complete survey of the area should be made by an independent agency and the condition of homes observed before blasting starts. Seismologists should be engaged and complete records be made for the first blast including weather and atmospheric conditions, preferably in the presence of law enforcement officers and other witnesses. All in the industry should become informed on the subject and every effort be made to get state legislation like that in New Jersey and Massachusetts.

Build Gypsum Plant

National Gypsum Co. is building a plant for the manufacture of gypsum wall board and plaster in Burlington County, N. J., near Philadelphia. The plant will have a 100,000 sq. ft. area.

YUBA JIGS for black sands



Handle any material that can be concentrated, such as

CASSITERITE	RUTILE
GOLD	SCHEELITE
PLATINUM, ETC.	GARNETS
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YUBA jig action is positive. Just set to desired speed and stroke, get constant uniform pulsations that create surface action over full area of jig bed. Result: YUBA M-8 jigs have large material capacity per flow line under full control.

Stroke adjustments between ¼" minimum and 3" maximum are easily and quickly made. Maximum frequency of a 4 cell M-8 jig is 350 at ¼".

YUBA jig design saves space, increases production in new or old dredges or mills. Use to supplement existing jigs or replace other concentration methods. For details of adapting YUBA jigs to your operation, send us data on ore, feed sizes and present installation.

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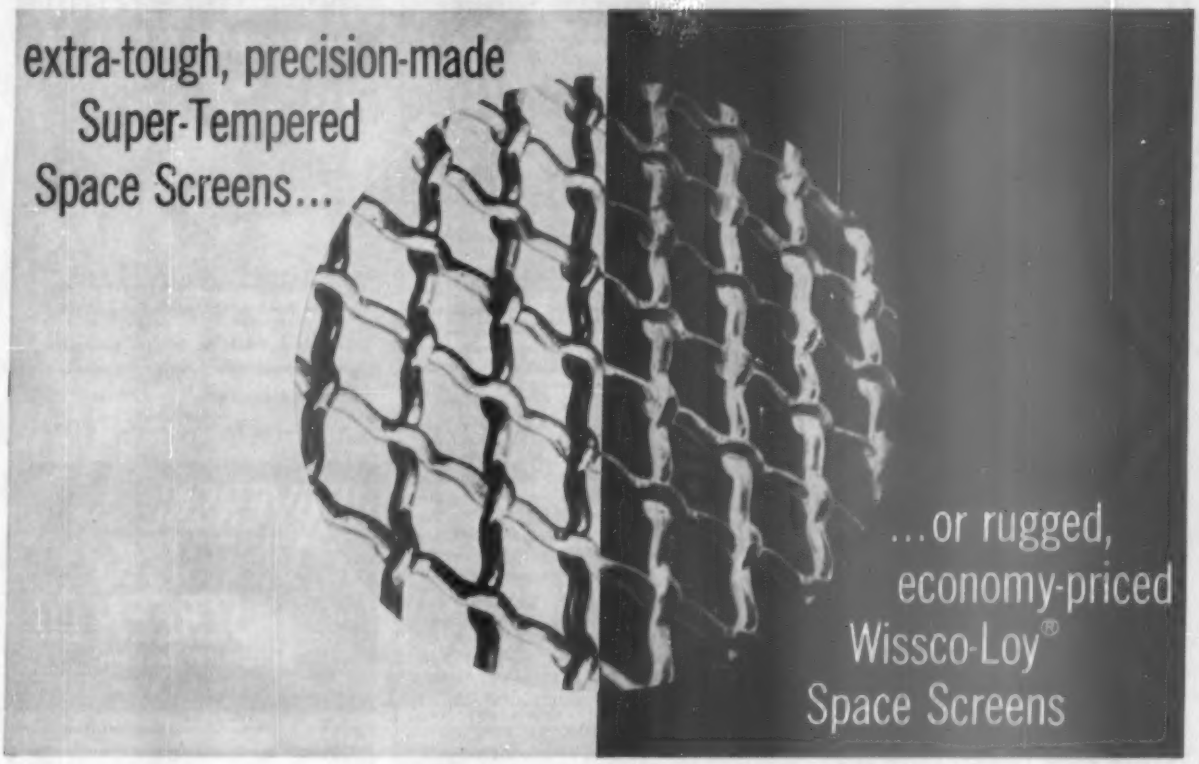
YUBA DREDGES PROVED DESIGN

YUBA MANUFACTURING CO.

Room 650 • 351 California St. • San Francisco 4, Calif.

which best suits your needs?



Different sizing jobs require screens with different characteristics. That's why your CF&I representative carries both Super-Tempered and Wissco-Loy Space Screens—so he can offer you the one that will give you the most for your equipment dollar. For he knows that:

Super-Tempered Space Screens are made from oil tempered wire that is crimped to precision standards and woven extra tightly to maintain accurate, uniform spacing *resulting in the lowest cost-per-ton screening under the severest operating conditions.*

Wissco-Loy Space Screens are made of a special alloy steel wire that's carefully crimped at every wire intersection to assure accurate, tough and durable screens which hold cost-per-ton screening to a minimum.

There's a very simple way to find out which of these attractively-priced space screens is best for your own job. Just contact your nearby CF&I representative; he'll be happy to give you the complete story on both extra-tough, precision-made Super-Tempered and rugged, economy-priced Wissco-Loy Space Screens.

CF&I

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The Colorado Fuel and Iron Corporation

THE COLORADO FUEL AND IRON CORPORATION—Denver and Oakland
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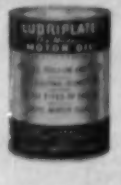
LUBRIPLATE No 630-AA IS PRACTICALLY A UNIVERSAL LUBRICANT

—says

THE SPOKANE PORTLAND CEMENT CO.

"With the introduction of LUBRIPLATE No. 630-AA, we were able to satisfy all our needs for solid type lubricants with only two LUBRIPLATE Products. LUBRIPLATE No. 630-AA might almost be considered a universal lubricant. Furthermore, it has effected marked savings in both lubricants and labor!"

REGARDLESS OF THE SIZE AND TYPE OF YOUR MACHINERY, LUBRIPLATE GREASE AND FLUID TYPE LUBRICANTS WILL IMPROVE ITS OPERATION AND REDUCE MAINTENANCE COSTS.



LUBRIPLATE is available in grease and fluid densities for every purpose... LUBRIPLATE H. D. S. MOTOR OIL meets today's exacting requirements for gasoline and diesel engines.

For nearest LUBRIPLATE distributor see Classified Telephone Directory. Send for free "LUBRIPLATE DATA BOOK"... a valuable treatise on lubrication. Write LUBRIPLATE DIVISION, Fiske Brothers Refining Co., Newark 5, N. J. or Toledo 5, Ohio.

MANUFACTURERS NEWS

General Electric Co., Syracuse, N. Y., was recently presented a Public Service Award by the Federal Civil Defense Administration for its "contribution to the national defense through participation in the Civil Defense Atomic Test Program last May. Raymond H. Williamson, manager of engineering administration for the G-E communication equipment section, was chairman of the joint atomic test committee for the FCDA and the Radio-Electronic-Television Manufacturers Association, and Dr. W. R. G. Baker, vice-president and general manager of the electronics division, was director of the RETMA engineering department.

The Gene Olsen Corp., Adrian, Mich., has announced the appointment of E. T. Keck as sales representative in most of Florida, eastern Georgia, North Carolina and South Carolina. Charles Ector continues as sales representative in northwestern Florida, western Georgia and all of Alabama, with Mississippi, Arkansas and Louisiana as additional territory. Mr. Keck has spent his entire business life in the concrete products machinery industry in the eastern and southeastern sections of the country.

E. T. Keck

Bezzer Co., Alpena, Mich., announces that the following representatives have been traveling abroad on sales and service missions for the Vibrapac concrete block machine: Earl McDonald covered western Canada and Alaska; Fred Lisovsky has been in England and Ireland; Bernard Neville traveled to Greece, Iran, Iraq, Turkey, Egypt and Pakistan; and John O'Donnell spent three months in the Latin American countries. Ralph Bailey, export manager, visited the Scandanavian countries, Germany and other European spots.

Gar Wood Industries, Inc., Wayne, Mich., has announced the appointment of Angus J. O'Brien as vice-president and director of engineering and manufacturing. He has been vice-president and director of manufacturing since 1949.

Koppers Co., Inc., Pittsburgh, Penn., has elected Dr. Paul W. Bachman as vice-president and director of research and development. Dr. E. W. Volkmann continues as manager of the research department.

Thor Power Tool Co., Aurora, Ill., announces the appointment of Harry L. Artinger as Pittsburgh branch manager of sales and service in most of the western half of Pennsylvania, southeastern Ohio and West Virginia.

Hewitt-Robins, Inc., Stamford, Conn., announces the appointment of Edward P. Larsen as director of engineering of Hewitt-Robins (Holland) N.V., Amsterdam, Holland. He was formerly western division manager with headquarters in Chicago, Ill.

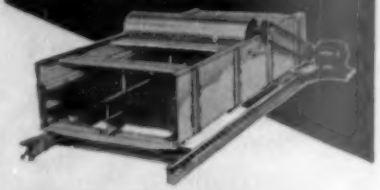
Schield Bantam Co., Waverly, Iowa, has announced the appointment of Buel M. Wallis as general sales manager. He was formerly sales manager of the Adams division of LeTourneau-Westinghouse Co., Indianapolis, Ind.

Barber-Greene Co., Aurora, Ill., has announced the appointment of W. E. Putz as advertising manager. He succeeds Wayne D. Adamson, Jr., who has resigned.

The White Motor Co., Cleveland, Ohio, has announced the appointment of Karl A. Roesch, director of service, as general manager of the Autocar division. He succeeds Edward F. Congan, who has retired after 31 years of service.

UNIVERSAL

OFFERS THE BEST IN VIBRATING SCREENS AT THE LOWEST PRICE



Before you buy, be sure to get a copy of the new UNIVERSAL Catalog #150!

There's a model to fit your particular requirement, priced within the smallest budget.

Write today for free catalog #150!

UNIVERSAL VIBRATING SCREEN CO.

Racine, Wisconsin

Quality Screens Since 1919

ROCK PRODUCTS

the Recognized Authority of the Non-Metallic Minerals Industry

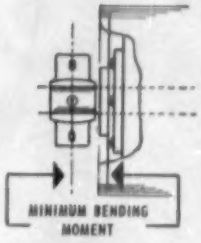
Take this step to insure pulley keyseat alignment

Link-Belt line includes welded steel and gray iron pulleys as well as welded steel slat pulleys. Choose from bolted or taper lock hubs.

Get LINK-BELT factory-assembled pulleys and shafts—take the work out of field mounting

IN addition to speeding field assembly and assuring alignment, Link-Belt factory-mounted pulleys have flush-hub design. The resulting minimum shaft deflection means better belt conveyor operation for you.

Whether your job calls for straight or crowned face . . . plain or herringbone vulcanized lagging —Link-Belt has popular sizes in stock. Call your nearby Link-Belt representative today for complete information.



Flush hubs minimize deflection, cut hub bolt stress and disc deflection.

LINK-BELT

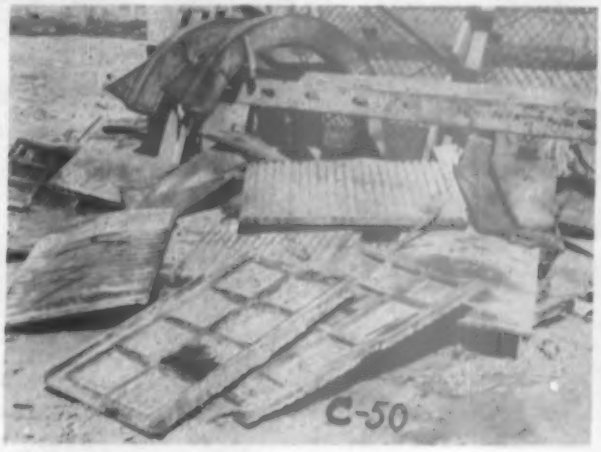
13,430-A

WELDED STEEL CONVEYOR PULLEYS

LINK-BELT COMPANY: Executive Offices, 307 N. Michigan Ave., Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office: New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World.

JUNK?... No More

Crusher Plates Rebuilt with MANGA-TONE N.M. last twice as long...



Just take a look at a typical assortment of crusher plates to be REBUILT.

It was only a few years ago that such a practice was regarded as "impossible" . . . "impractical" . . . "not economical".

All that sort of thing is gone today. Your Resisto-Loy dealer can take care of this problem in the same efficient manner in which he handles any other problem of WEAR-PREVENTION for you.

It's real economy to have your Crusher Plates rebuilt the Two-Tone way. What's more, they will LAST LONGER THAN A NEW PLATE.

Call in our field man and let him work out this and your other problems of wear prevention.

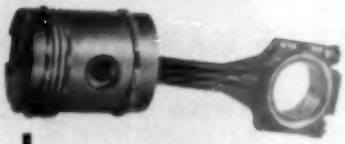
THE RESISTO-LOY CO., INC. - Grand Rapids 7, Michigan

It's fun to be fooled at a CIRCUS

...but don't let anyone fool you with "Will-Fit" Replacement Parts!

ONLY ONE OF THESE IS GENUINE...

ONLY ONE IS GUARANTEED TO DELIVER SERVICE!



There's no such thing as "or equal" replacement parts for Buda engines. *Only Buda* can produce and supply the *exact* replacement parts designed to keep Buda engines operating at maximum efficiency and profit to you.

Whether it's a piston . . . a set of rings . . . a gasket, gear or filter—whatever part you need—play it safe and sure by insisting on genuine factory engineered Buda replacement parts *every time*. It pays dividends in the long run.

BUDA DIVISION • HARVEY, ILLINOIS

Your nearby Buda Division Engine Distributor carries a large stock of genuine Buda replacement parts. Call on him for your requirements.

ALLIS-CHALMERS

BC-34

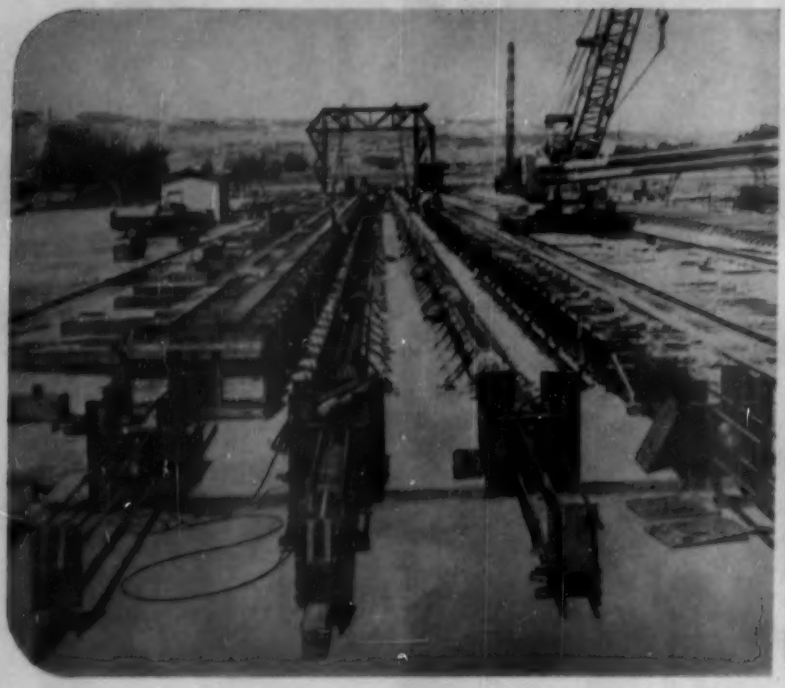
CONCRETE PRODUCTS

A SECTION OF ROCK PRODUCTS

CONCRETE UNITS · READY-MIXED CONCRETE

Crow & Crow Ready Mix, Faribault, Minn., placing concrete for sewage treatment plant

PRESTRESSED CONCRETE PILES
CUT MARINE TERMINAL COST!



(Above, left) Casting yard of the contractor, Ben C. Gerwick, Inc., San Francisco, consists of a 4-line 500' long bed and a 3-line 340' bed. Here the 500' bed is producing 23' and 28' long pile tops on 3 lines. On the left line piles are being steam cured. Strands are being tensioned in the next line while the third line is ready for release of tension. Fourth line has square pretensioned concrete piles for another project.

(Above) Each 14" octagonal pile top is cast complete with pipe section for splicing to timber pile.

CONVERTING Piers 15 and 17 into a unified shipping terminal, the Port of San Francisco's Board of State Harbor Commissioners, Mr. S. S. Gorman, Chief Engineer, will soon be using 20" prestressed concrete piles 131'6" long. They will be of the pretensioned, bonded type using 18 Roebling ⅜" dia. 7-wire stress relieved prestressed concrete strands.

Now being driven are timber piles up to 104' long topped with 14" octagonal prestressed members 23' to 28' long. The pile splice will be 10' below mud line. These tops are pretensioned with 11 Roebling ⅜" dia. prestressed concrete strands. Both types of pretensioned piles use 4300 P.S.I. concrete which is obtained in 24 hours with steam curing.

Both the long and composite prestressed piles were chosen over regular precast concrete and Gunited timber piles, respectively, for one reason—lower "in place" cost!

Whether it's piles, girders or slabs; bridges or entire buildings, Roebling engineers know how to get peak efficiency with prestressed concrete. And they will be glad to supply you with full information of tensioning materials and fabricating methods. Write Construction Materials Division, John A. Roebling's Sons Corporation, Trenton 2, New Jersey.

20
16" ID
SPIRAL
11" DIA
HOLE
CROSS SECTION
Overall Length 131' - 6"
Pre-Tensioning Steel - 18 Roebling ⅜" dia 7-wire
stress - relieved prestressed concrete strands.
Spiral - 5 turns close pitch each end, then 20 turns
3" pitch each end and 9" pitch in center portion.
Hole made by casting in 11" OD paper tube

ROEBLING

Subsidiary of The Colorado Fuel and Iron Corporation

INDUSTRY NEWS

Cover Picture

ON THIS MONTH'S CONCRETE PRODUCTS COVER is shown a construction scene where concrete is being placed for a new sewage treatment plant for the city of Faribault, Minn., and the State of Minnesota. Approximately 4260 cu. yd. will be placed by the Steenberg Construction Co., St. Paul. Crow & Crow Ready Mix, Faribault, Minn., used two Rex model 160 single Pumpcretes set up side by side charging from three 5½-cu. yd. Rex Adjusta-Wate Moto-Mixers and two 6½-cu. yd. Rex Moto-Mixer units. This arrangement permitted the placing of concrete at two different places at one time.

Ready-Mix Expansion

BIG ROCK STONE & MATERIALS CO., Little Rock, Ark., is expanding, at a cost of between $50,000 and $75,000, with the addition of two new ready-mixed concrete plants, one in Jacksonville, and the other in Little Rock. Eight trucks will handle delivery from the Jacksonville plant, and two trucks will be added to the present fleet of 28 trucks in Little Rock, to serve the two plants there. The company has been in operation for over 30 years. W. E. Croman is vice-president and general manager.

Purchase Two Plants

W. G. BLOCK CO., Davenport, Iowa, has purchased Automatic Gravel Products Co. and Bi-Crete Pre-Mix Co. from Fred O. Block, Davenport, Iowa. The gravel company operates sand and gravel plants at Muscatine, Iowa, and the concrete firm produces "Dri-Crete" and asphalt at Muscatine. Operations of both plants have been consolidated, and are being operated by Acme Fuel & Material Co., a subsidiary of W. G. Block Co. George Koenigsaecker, vice-president of Acme, is in charge of operations. Operating personnel of both companies were retained.

Enter Concrete Products Field

MILLER & HART, INC., a cold storage firm of Chicago, Ill., has obtained an option to purchase the outstanding stock of the Federal Cement Tile Co., Chicago, for $1,265,000. Stockholders are also being asked to approve a merger with the Mount Vernon Bridge Co., Mount Vernon, Ohio. If approved, the company will be known as the Mount Vernon Co.

Modernizes Concrete Plant

ALVIN BUILDING MATERIALS, INC., Alvin, Texas, has completed a modernization and expansion program, costing about $50,000, at its ready-mixed concrete plant. The firm acquired a warehouse, near its present buildings, which was remodeled and air-conditioned for offices. The plant produces 500 cu. yd. of concrete daily, and facilities can be increased to provide 1000 cu. yd. daily production when necessary.

Opens Block Plant

CITY BLOCK AND SUPPLY company recently started production at a concrete block plant in Medina, Ohio, costing about $100,000. The plant produces approximately 700 units per hr. Edward Rickard is plant superintendent and Joe Campbell is sales manager. Both men formerly operated the Medina Concrete Products company.

•

LAYRITE CONCRETE PRODUCTS OF SEATTLE, INC., Seattle, Wash., has opened a sales office in Bellevue, Wash., for concrete masonry units. John Slagle has been appointed resident sales representative.

An employes' picnic at the Fort Pierce, Fla., block plant of Rinker Materials Corp., with block serving as tables

J. D. MCCOTTER, INC., Washington, N. C., plans to build a ready-mixed concrete and building supplies plant at Edenton, N. C. The plant will handle ready-mixed concrete, sand, gravel, roofing products, millwork, lumber, hardware, bricks, concrete block, paint and concrete septic tanks. It will also rent equipment such as cranes, bulldozers, grading equipment, and draglines. The company also operates a plant at Williamston, N. C.

A READY-MIXED CONCRETE PLANT has started operations at Hallettsville, Texas, owned by C. C. Palmer, Sr., who also owns Guadalupe Valley Gravel Co. and Palmer Construction Co. Walter F. Vernor is manager of the concrete company and the construction firm.

BUEHNER BLOCK, Salt Lake City, Utah, is producing a two-core concrete masonry unit, designated the Buehner 6-12 Block. The block has a combed texture face and is 5⅝ x 3⅝ x 11⅝ in. or a nominal 6 x 4 x 12 in. It is available in four colors and is suitable for exterior load-bearing walls.

JOHN A. DENIE'S SONS, Memphis, Tenn., has started operations at its fourth ready-mixed concrete plant in Memphis and Shelby County. The new plant has a daily capacity of 3000 cu. yd. of ready-mixed concrete.

READY MIX CONCRETE CO., Waynesville, N. C., recently began operations, with a capacity of 150 to 200 cu. yd. of ready-mixed concrete daily. A 2-cu. yd. and two 4½-cu. yd. capacity transit mixers are used. Bill Norris is plant manager.

THE WILLIAM SMITH & SONS READY-MIX CONCRETE plant has begun operations at Vandalia, Mo. The company manufactures building supplies, as well as ready-mixed concrete.

CAPITOL CONCRETE BLOCK PRODUCTS CO. has started operations at a concrete block plant in Salem, Ore., costing approximately $60,000. W. J. Murphy is head of the company which was formerly located at Leavenworth, Kan.

PRESTRESSED CONCRETE CO., Salt Lake City, Utah, recently manufactured what are said to be the largest plant-made prestressed concrete girders in the world. The five giant roof girders each measured 115 ft. long and almost 7 ft. high.

PLASTICRETE SPECIALTIES CORP., Hamden, Conn., has joined with Norian Co., Inc., Newark, N. J., to manufacture Mono-Cel concrete products.

UNITED CONCRETE PIPE CORP.'s concrete pipe plant in Pleasant Grove, Utah, is operating at full capacity. J. N. Burnham is plant superintendent.

WHITE MAGIC

...FOR CONCRETE PRODUCTS!

You can perform white magic in your concrete product! Use Medusa "the original" White Portland Cement for cast stone, concrete blocks, concrete brick and tile, curbing, ornamental concrete, fence and marking posts and many other products, and notice the amazing results. You'll be amazed at their white or colored beauty . . . a new clean look that sets your products apart from any competitors. That's because in all the world there is no whiteness like the diamond blue white of Medusa White. Concrete products manufacturers in every state have built successful business by taking full advantage of the magic of Medusa White . . . And for products whose beauty lasts indefinitely they use Medusa White *Waterproofed*. It sheds water and dirt . . . keeps concrete products free from dirt soiling for years to come.

Medusa White used in the manufacture of Cast Stone for the J. L. Long Junior High School, Dallas, Texas.

MEDUSA Portland Cement Company

1000 Midland Building • Cleveland 15, Ohio

SALES OFFICES

Cleveland, Ohio
Chicago, Illinois — Toledo, Ohio
Pittsburgh, Pa. — New York, N. Y.
Milwaukee, Wisc. — York, Pennsylvania

WHITE • WATERPROOFED WHITE • GRAY
WATERPROOFED GRAY • AIR ENTRAINING • STONESET
HIGH EARLY STRENGTH • BRIKSET
WHITE TILE GROUT CEMENT

MAKERS OF AMERICA'S FINEST PORTLAND CEMENTS FOR OVER SIXTY YEARS

Denie's Ready Mix Concrete, Memphis, Tennessee

Samson Block & Supply Company, Media, Pennsylvania

Transit Mix Concrete & Foundation Company, Beaumont, Texas

San Jose Transit-Mix Concrete Company, San Jose, California

Concrete Supply Company, Charlotte, North Carolina

Thos. E. Currie Company, Detroit, Michigan

Concrete Corporation of Indiana, Indianapolis, Indiana

Gravel Products Corporation, Buffalo, New York

Most successful way to sell concrete

If you are interested in ready mixed concrete *as a business*, it is important to you that more concrete is sold in Jaeger truck mixers than by any other method.

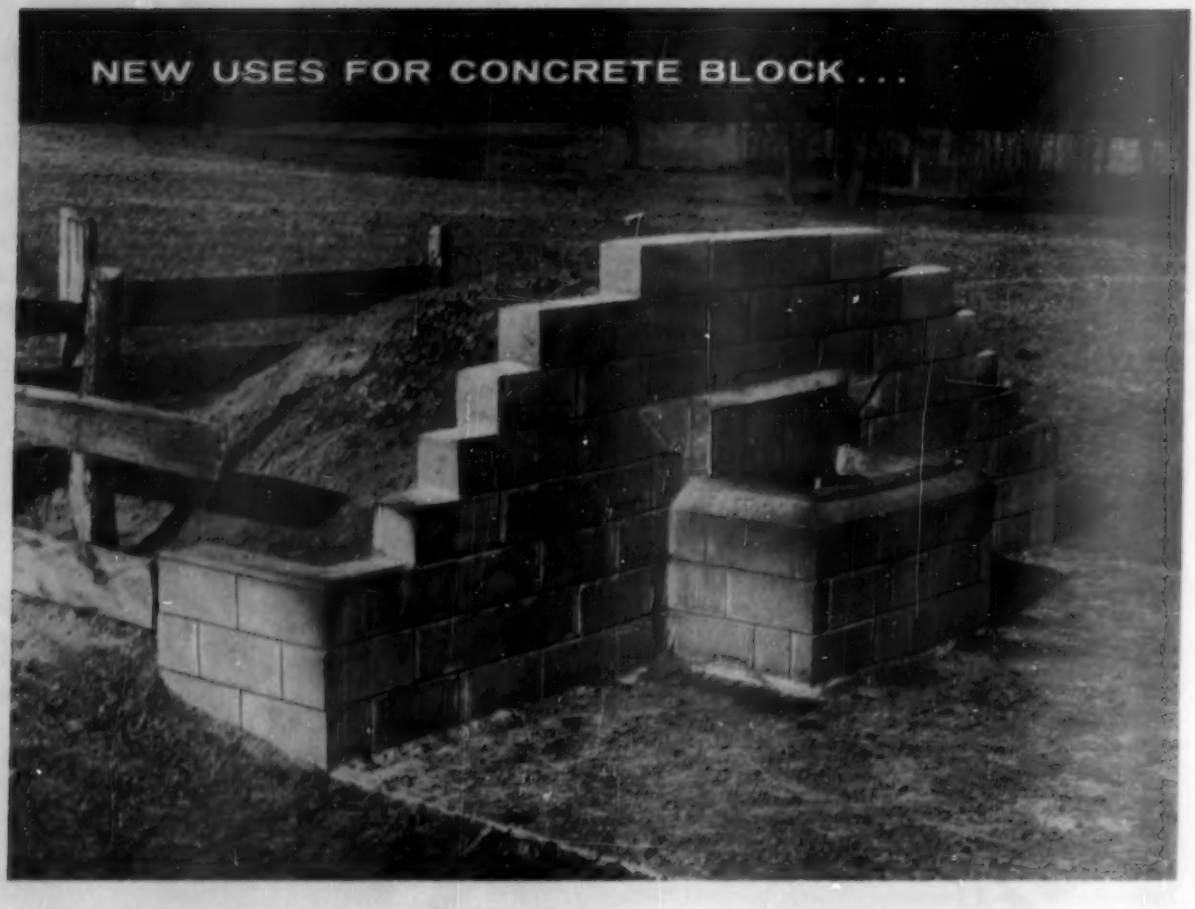
It is important because it establishes the Jaeger truck mixer, beyond any and all claims, as the first choice of successful operators, from the world's largest (210 mixers) fleet of Colonial Sand & Stone Co. in New York City, down to small one and two-mixer plants.

Between New York and California, there are many types of plant operations, local practices, weight limitations and payload requirements for which the broad Jaeger line offers a complete range of choice. Your Jaeger distributor knows your own local conditions and how Jaeger basic units can be most efficiently equipped to serve your requirements. Check with him or write today for catalog.

THE JAEGER MACHINE COMPANY

603 Dublin Avenue, Columbus 16, Ohio

LOADERS • COMPRESSORS • PUMPS • CONCRETE MIXERS • PAVING MACHINES

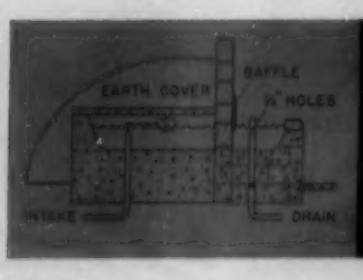


OPPORTUNITIES FOR INCREASED SALES . . .

New uses for concrete block are constantly being found . . . on the farm, in the city. Some are unusual applications. Others, like the all-weather watering arrangement shown here, are in ordinary construction where other materials are commonly used.

A study of construction needs in your own vicinity may uncover opportunities you never thought of before. And when you suggest new or different ways to use your product, you step out in front of competition, develop profitable sales others often overlook.

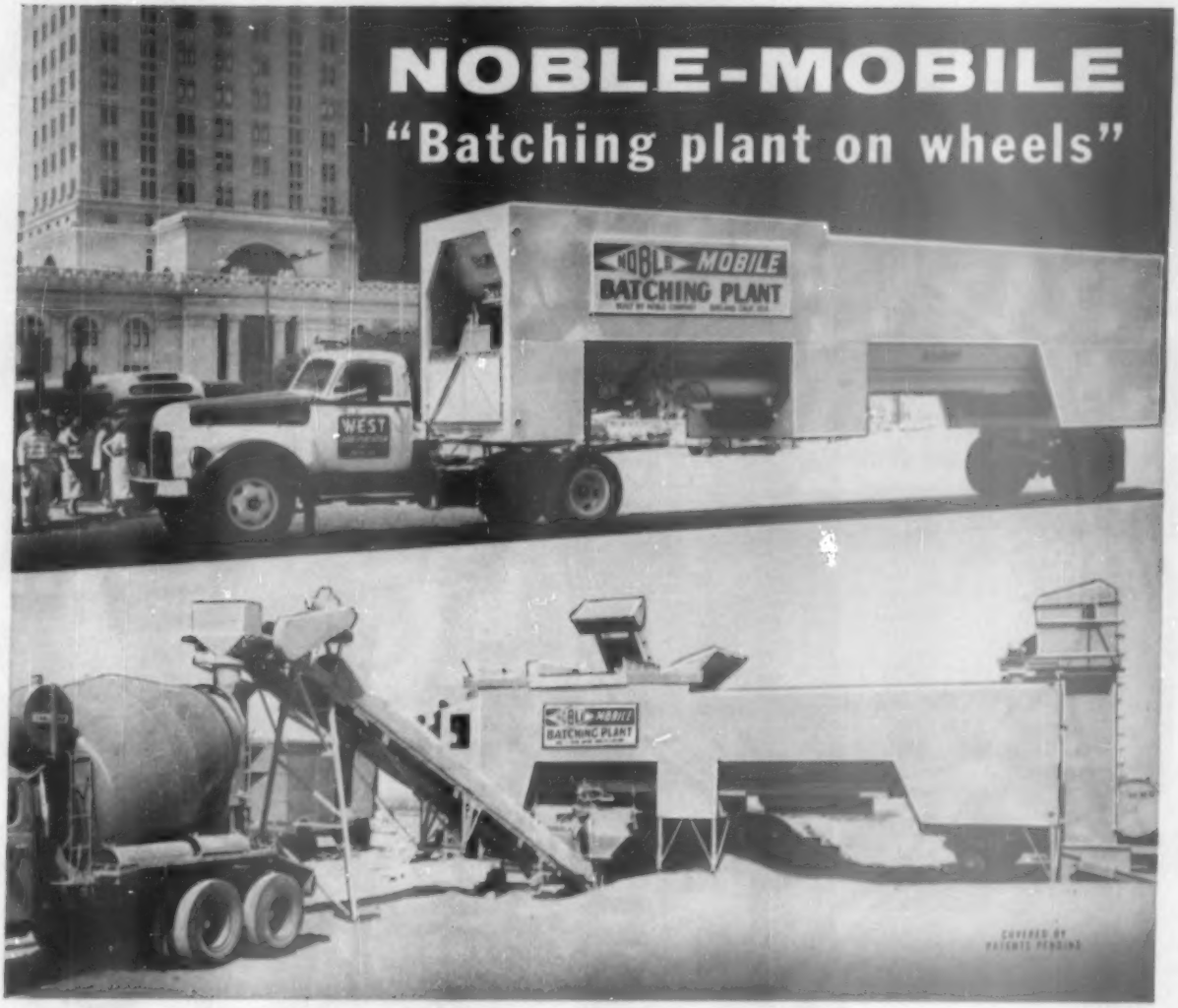
For the most profitable production, include Lehigh Cement in your plans. Remember, there's a Lehigh Cement to help you produce quality units with any manufacturing process.



LEHIGH PORTLAND CEMENT
LEHIGH MORTAR CEMENT
LEHIGH EARLY STRENGTH CEMENT
LEHIGH AIR-ENTRAINING CEMENTS

LEHIGH *Allentown, Pa.*

PORTLAND CEMENT CO.

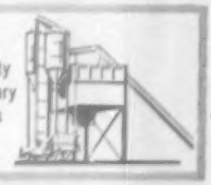


the complete plant that saves erection costs... drive it to the job site and start batching!

Noble-Mobile lets you batch at the job site proper where shorter hauls result in greater capacity. You go quickly into production . . . no footings, crane or electrical wiring required.

Noble-Mobile utilizes bulk cement. Aggregates charged with scooploader, conveyor or clamshell. 60 yards per hour or more output to truck mixers. Noble-Mobile drives the highways within legal limits. No special permit required.

NOBLE BATCHING PLANTS



• *DESIGNERS AND BUILDERS* •

For further details phone, write or wire **NOBLE COMPANY**

1860 7th Street, Oakland 20, California, TEmplebar 2-5785 • 20950 Center Ridge Road, Cleveland 16, Ohio, EDison 1-3426

Unequalled in Production Capacity

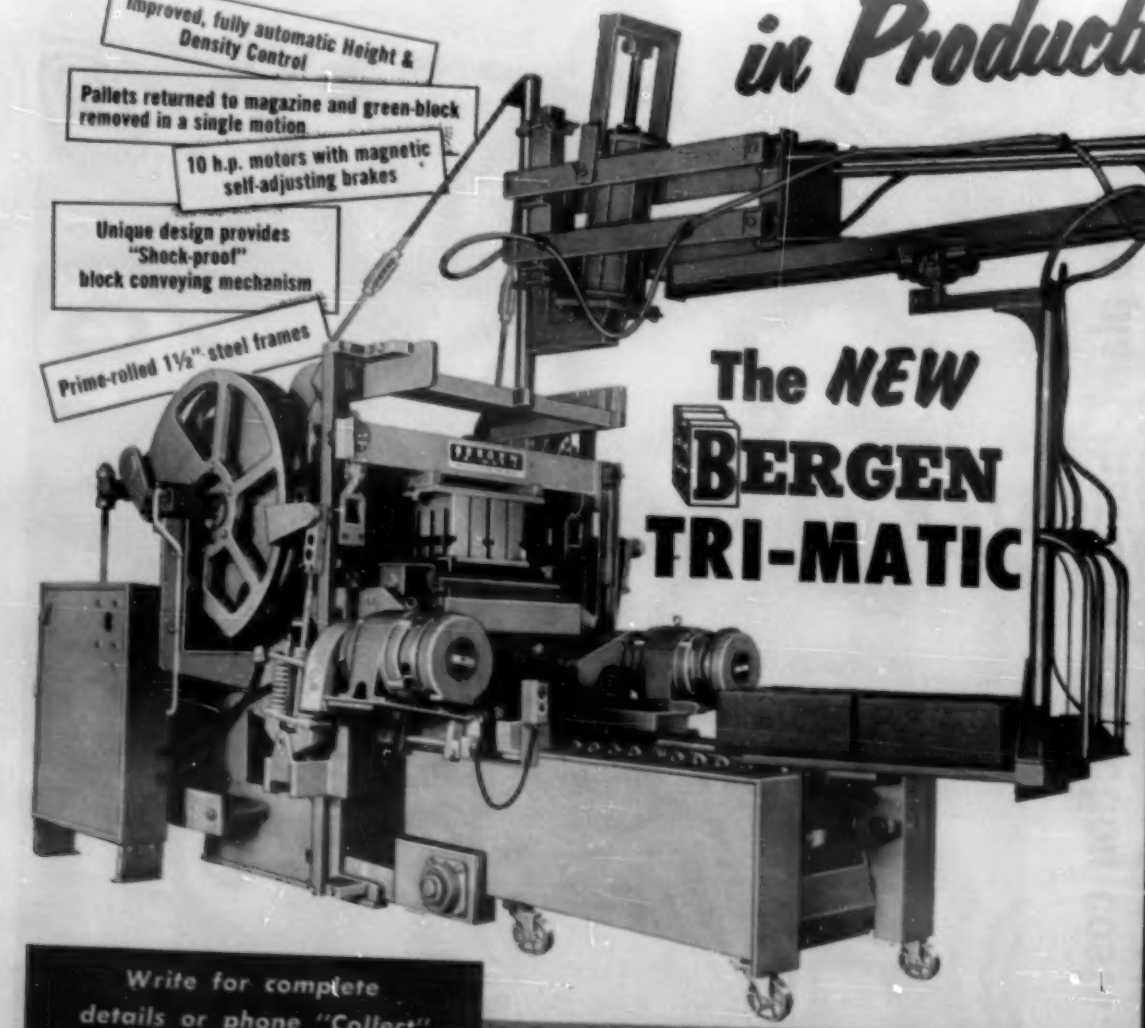
Improved, fully automatic Height & Density Control

Pallets returned to magazine and green-block removed in a single motion

10 h.p. motors with magnetic self-adjusting brakes

Unique design provides "Shock-proof" block conveying mechanism

Prime-rolled 1½" steel frames



The NEW BERGEN TRI-MATIC

Versatility — All standard sizes and many special types of block can be made on a single 18½x26" plain pallet.

Design — The TRI-MATIC operates on the time-proven positive-acting cam, roller and lever arm principle.

Production — Up to 6 mold cycles per minute, yielding an average production of 10,000 — 8" equivalent units per typical 10 hour day.

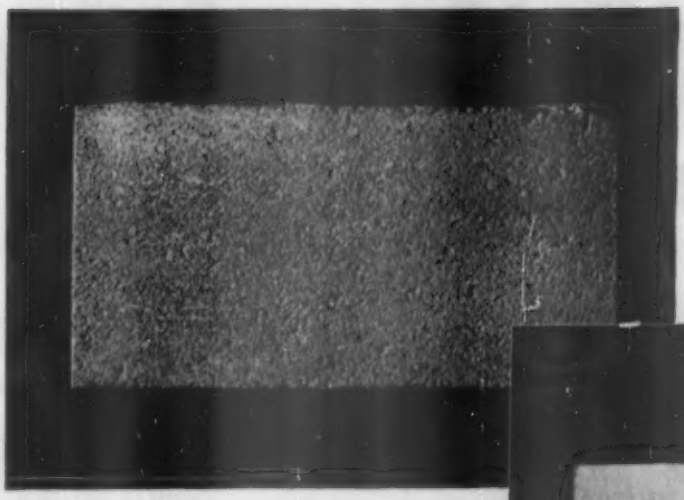
Power — Super power to provide highest intensity vibration, with maximum rate of compression producing units of controlled density and uniform texture.

Performance — Engineered and built to provide continuous high production operation under the most exacting operational conditions.

Write for complete details or phone "Collect" NUtley (N.J.) 2-7300

BERGEN MACHINE & TOOL CO., INC., NUTLEY, NEW JERSEY

Cable address "BERGENCO" Nutley, N. J.



ORDINARY BLOCK Without NR PLASTIC—
ROUGH FINISH, DARK COLOR

IMPROVED BLOCK* With NR PLASTIC—
SMOOTH FINISH, LIGHTER COLOR

* Manufactured at HOERNING'S CONCRETE PROD. CO., Menasha, Wisconsin.

With
JUST *ONE* TABLESPOON OF
DRY, POWDERED
NR PLASTIC
PER BAG OF CEMENT!

GREATER PLASTICITY IN THE GREEN UNIT — PLUS 20% LIGHTER COLOR . . .

Cost. . . ½c per Bag of Cement!

Hydrate ALL the cement in your dry block and pipe mix . . . with just *one* tablespoonful of dry, powdered NR PLASTIC per bag of cement. Cost.....½c per bag!

YOU'LL GET . . . . . .

A 20% lighter colored unit with a more thoroughly wetted cement paste! Complete hydration through complete saturation without adding more water! Sharper corners . . . better texture . . . smoother, denser surfaces through greater compaction! Faster, cleaner feeding into . . . and stripping from . . . the mold box! 50% reduction in wear on mold box liners! Greater plasticity in the green unit through absolute dispersion of water and cement . . . and . . . complete coating of all the aggregate particles! Simple and economical to use . . . add dry as it comes from the container! Cost ½c per bag of cement!

MAIL COUPON TODAY

Write for literature and free 8 lb. sample of NR PLASTIC.

Edick Laboratories
427 W. National Ave., Milwaukee 4, Wis.

Gentlemen, Please RUSH Sample of NR PLASTIC

NAME ..... **TITLE** .....

FIRM .....

ADDRESS .....

CITY ..... **ZONE** ..... **STATE** .....

Edick LABORATORIES

427 W. National Ave. Milwaukee 4, Wis.

When increased demand makes plant expansion necessary...

design with Fanning-Schuett

CORSON CONCRETE COMPANY, Plymouth Meeting, Pa., is expanding its plant with an additional large storage bin and an additional mixer and batching facilities to meet the expanded demand for control mix in the Plymouth Meeting - Norristown area. The present belt conveyor will serve both storage bins by the addition of a short return belt conveyor for the second bin. Another Fanning-Schuett plant addition.

The problem of providing enough cement and concrete for the tremendous building program of our ever-growing economy has focused attention on the need for plant expansion. All over the country concrete plants are turning to Fanning-Schuett for economical additions to existing facilities.

For new plants as well as these expansions, there is a good reason for designing with Fanning-Schuett. Almost a half-century of experience has given Fanning-Schuett a "know-how" which means top efficiency in cement and concrete handling and storage equipment.

MAINE CEMENT PRODUCTS COMPANY, INC., Portland, Maine. A complete new plant is being designed and built for this rapidly growing company to produce concrete blocks and other products for the Home Building Program. Included in the plant are five storage bins for aggregates; one storage bin for cement; and handling equipment such as machinery for handling cement, screw and belt conveyors and two elevators.

FANNING-SCHUETT JOBS IN PROGRESS

SUPER CONCRETE CO., INC., Cumberland, Maryland. This company is building a whole new plant for ready mix concrete and manufacture of blocks.

CONCRETE PRODUCTS COMPANY, Shippensburg, Penna. This company manufactures concrete blocks and other building products and is now converting to handle bulk cement. They are installing an unloading screw conveyor and elevator, a storage bin for 400 barrels, a screw conveyor and automatic controls for scale equipment over the mixer.

RIDGE CONCRETE, INC., Bartow, Florida. The ready mix concrete plant of this company is being expanded, and they are also installing block-making equipment for which they have purchased storage bins and an extension of their present belt conveyor system.

McDERMITT BROS. READY MIX CONCRETE, Gettysburg, Penna. This company is prominent in the Gettysburg area and has been in the ready mix business for many years. They have just made a large installation at Union Bridge, Maryland to supply ready-mix concrete for the expansion of the facilities for the Lehigh Cement Co. They have also made a complete setup for handling of aggregates including elevators for sand and stone and a bulk cement handling outfit. **GELBMAN, INC., EXPANDED AGGREGATES CORP.,** New York City, N. Y. This company is starting to build a complete plant for manufacturing light weight aggregates from slate wastes. They will install rotary dryers, belt conveyors, crushers, mixers, etc., to make a complete plant for the manufacture of light weight aggregates by sintering.

FANNING-SCHUETT ENGINEERING COMPANY
4325-39 NORTH THIRD STREET PHILADELPHIA-PENNSYLVANIA

WESTINGHOUSE Transit Mixers

Have the Most Efficient Drum Drive Mechanism

• No other mixer has a drum drive which is as positive, sturdy and trouble-free as Westinghouse and yet affords complete flexibility. Follow the drive from engine to drum in the illustration at right:

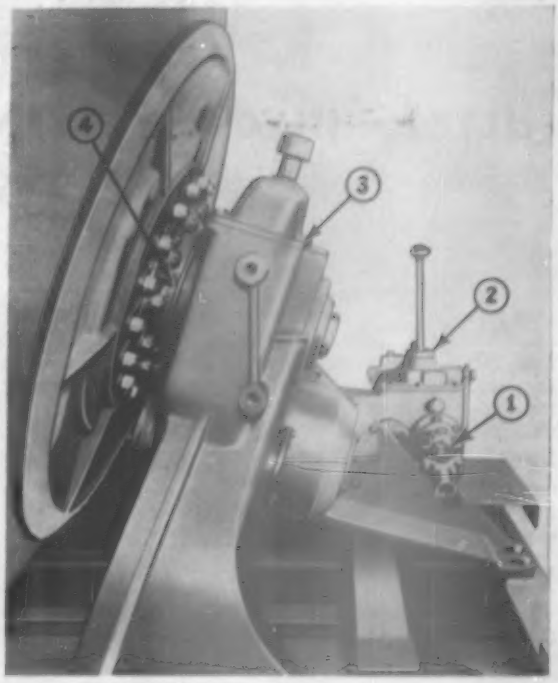
1. A strong universal joint takes the engine power to the transmission eliminating possible strains due to frame flexing.

2. Two-speed transmission (standard on all models) permits wide range of drum revolutions, from 2 to 11 r.p.m., within engine's most efficient operating range—600 to 1700 r.p.m.

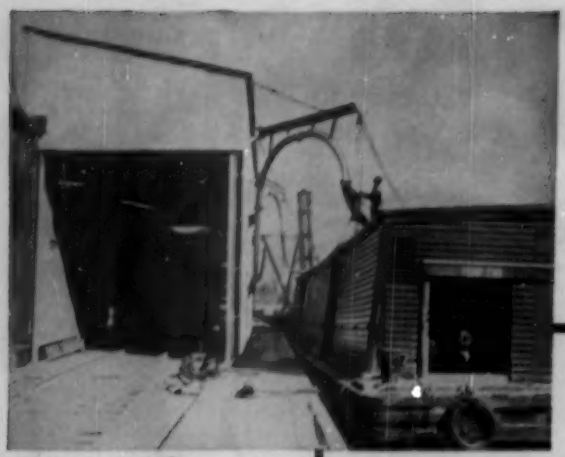
3. Drum is driven by fully-enclosed gear drive—*an exclusive patented feature.* No chains or exposed gears to wear out and replace. Requires little attention and maintenance.

4. Drum has large ball-and-socket mounting *at the drum* —an exclusive feature. The only mounting which does not transmit misalignment to driving parts due to flexing of truck and mixer frames in traveling over uneven surfaces.

Westinghouse mixers are available in 5 sizes—4½ to 6½ yd. They have other important features you'll like. Before buying another mixer write for descriptive literature to



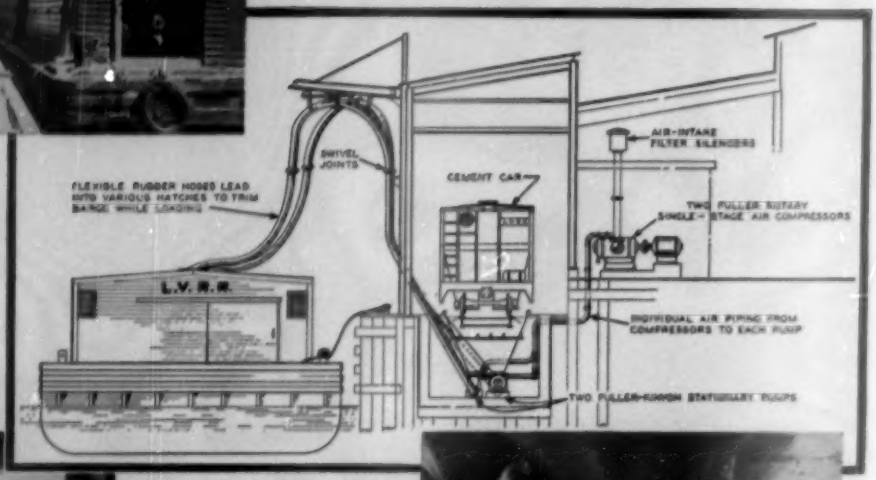
ADAMS DIVISION
LeTourneau-Westinghouse Co., Indianapolis, Ind.
Member of NRMCA



Hoses entering hatches of barge. Cement car in shed "spotted" over Fuller-Kinyon Pumps in pit. Fuller-Kinyon Unloader in doorway, end of barge.

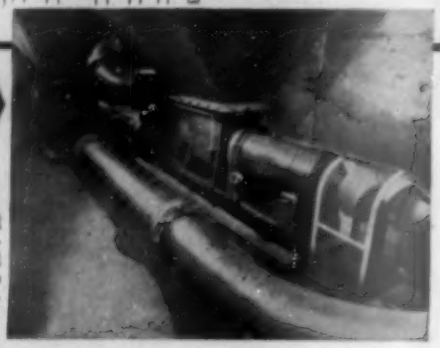
Air does it...

SPEEDIER
CLEANER
MORE EFFICIENTLY


FLEXIBLE RUBBER HOSES LEAD INTO VARIOUS HATCHES TO TRIM BARGE WHILE LOADING
SWIVEL JOINTS
CEMENT CAR
AIR-INTAKE FILTER SILENCERS
TWO FULLER ROTARY SINGLE-STAGE AIR COMPRESSORS
L.V. R.R.
INDIVIDUAL AIR PIPING FROM COMPRESSORS TO EACH PUMP
TWO FULLER-KINYON STATIONARY PUMPS

Two Fuller-Kinyon Stationary Pumps in pit. Pumps convey to barge at rate of 900-1000 bbl. an hour.

Unloader behind bulkhead in end of barge. At destination bulkhead is removed and unloader is propelled into barge, unloads cargo to storage on shore.



FULLER-KINYON SYSTEM unloads cars . . . conveys to barges . . . unloads barges for Lehigh Valley Railroad

In order to reduce the overall cost and speed up handling of bulk-cement shipments at its Jersey City terminal, Lehigh Valley Railroad engineers installed the Fuller-Kinyon Conveying System. Fuller-Kinyon Stationary Pumps convey from cars to barge, and Fuller-Kinyon Remote-Control Unloaders convey from barge to storage at various points in New York harbor . . . speedy, efficient, time-saving handling from the time cars arrive until final delivery to the consumer.

The pumps for unloading from cars to barge, convey through two conveying lines at rate of 900 to 1000 barrels an hour. The unloader has a rated capacity of 150 barrels an hour. One man operates and controls this machine by means of a flexible electrical cable and hand-control switch . . . start and stop, to right or left, forward or backward, wherever cement is to be picked up in the barge.

Air for the Fuller-Kinyon Stationary Pumps is supplied by two Fuller Rotary Compressors, each having a capacity of 614 c.f.m., at 12-lb. pressure. These compressors are installed on the pier adjacent to the car-unloading station.

If you are interested in efficient handling of bulk cement, write for Bulletins FK-20C and FK-27, illustrating and describing cement handling with Fuller equipment.

P-155
1289

DRY MATERIAL CONVEYING SYSTEMS AND COOLERS—
COMPRESSORS AND VACUUM PUMPS—
FEEDERS AND ASSOCIATED EQUIPMENT

FULLER COMPANY, Catasauqua, Pa.

GENERAL AMERICAN TRANSPORTATION CORPORATION SUBSIDIARY

Chicago • San Francisco • Los Angeles • Seattle • Birmingham

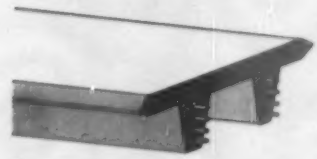
Big Profits!

WITH Form-Crete*

PERMANENT STEEL FORMS

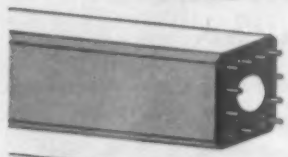
...for casting multi-purpose concrete products

All "Form-crete" forms are manufactured from A.I.S.C. specifications high quality steel.



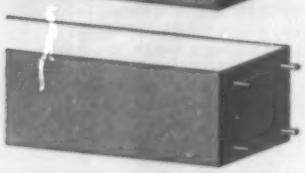
DOUBLE "T"—Steel forms for poured-in-place beds and all steel semi-portable beds. Also "Form-crete" Design Filler channels in 2" and 4" graduations.

BRIDGE BEAMS—Full range of all steel forms for pre-stressed and post-tension "I"-Beams.



SQUARE AND OCTAGONAL PILING—Full range of steel forms including pallet liners and points.

HOLLOW LINTEL—Module block size allsteel forms with headers, long spans, or side by side gang assembly.



SOLID LINTEL—Module block size can be produced by "Form-crete" method in same forms as hollow lintels by removing center insert.

SHOWN ABOVE:
"Form-crete" DOUBLE "T" semi-portable all steel form.

*Trade name for Food Machinery and Chemical Corporation's especially designed, engineered and manufactured steel die-forms for moulding prestressed concrete construction units.

FLORIDA DIVISION

FOOD MACHINERY AND CHEMICAL CORPORATION
P. O. BOX 1718, LAKELAND, FLORIDA

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PF-2

MAIL THIS COUPON TODAY

SEND "FORM-CRETE" INFORMATION ON ITEMS CHECKED.

Name_____

Address_____

City_____ State_____

☐ Double "T" ☐ Bridge Beams ☐ Square Pilings ☐ Hollow Lintels ☐ Solid Lintels

Free—PRE-STRESSED FOLDER

Hilton Makes Hotel History

Ingenious Design Cuts Construction Costs on Dallas' 1001-Room Statler-Hilton

● Soon to open in Dallas, Texas, is the luxurious 18-story Statler-Hilton, one of the largest hotels built in 25 years, and latest in the group of 28 hotels welded together by Conrad N. Hilton into the world's greatest hotel organization.

Construction cost of this 1001-room hotel was $9,350. per room ($1.54 per cu. ft.), against an $11,000-per-room average for other new hotels in the system. The reinforced-concrete structural system not only saved money but contributed to the esthetic and functional development of the design.

Of flat-plate construction, the building is T-shaped, with three wings, each about 156 ft. long and 48 ft. wide, radiating from a central core. There are only two longitudinal rows of columns in each wing, with floors cantilevered 10 ft. beyond column centerlines to support the sandwich-panel walls. Floor slabs are 8 in. thick; no drop panels or column capitals used; only painting was required.

In this latest example of the advantages of reinforced-concrete frame construction, a total of 48,305 bbls. of Lone Star Cement was used. Equally proud is Lone Star of the part its products have played in other famous Hilton Hotels—the Waldorf-Astoria, the Shamrock-Hilton, Houston, and the new Statler-Hilton, Hartford, Conn.

As is so often the case, quality has a way of attracting quality.

THE STATLER-HILTON HOTEL, Dallas, Texas
Owner: HILTON HOTELS CORPORATION
Architect: WILLIAM B. TABLER, New York
Contractor: ROBERT E. McKEE GENERAL CONTRACTOR, INC Dallas, Texas
Structural Engineers: SEELYE, STEVENSON, VALUE & KNECHT, New York
Mechanical Engineers: JAROS, BAUM & BOLLES, New York
Haydite Lightweight Block and Aggregate supplied by: TEXCRETE COMPANY, Dallas

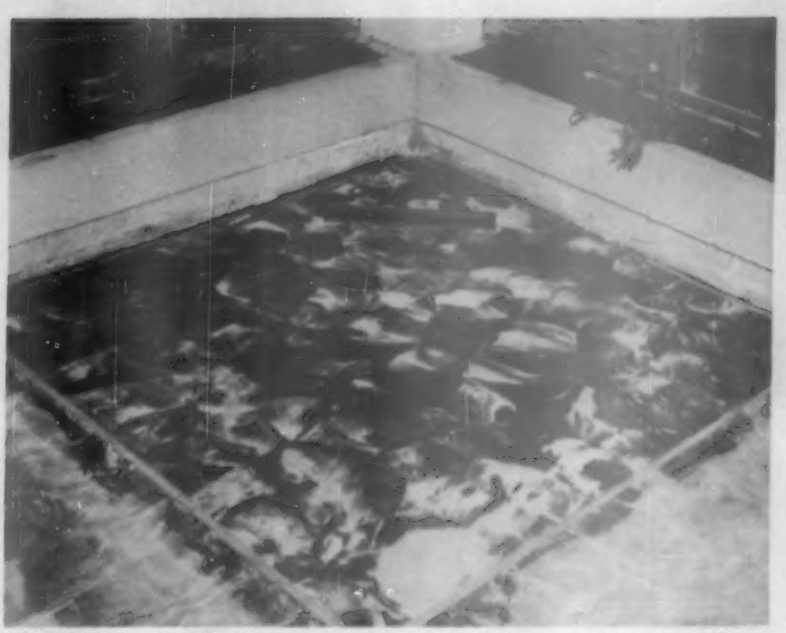
LONE STAR CEMENTS COVER THE ENTIRE CONSTRUCTION FIELD

LONE STAR CEMENT CORPORATION

Offices: ABILENE, TEX. • ALBANY, N. Y. • BETHLEHEM, PA. BIRMINGHAM • BOSTON • CHICAGO • DALLAS • HOUSTON INDIANAPOLIS • KANSAS CITY, MO. • NEW ORLEANS • NEW YORK NORFOLK • RICHMOND • WASHINGTON, D. C.

LONE STAR CEMENT, WITH ITS SUBSIDIARIES, IS ONE OF THE WORLD'S LARGEST CEMENT PRODUCERS: 18 MODERN MILLS, 141,600,000 SACKS ANNUAL CAPACITY

This floor slab system permits year-around air-conditioning without ducts through open spaces beneath floor



When the floor slabs have been laid, a terrazzo seal is applied to sharpen the colors

By C. E. WRIGHT

Colored Precast Slab Floor System

A COLOR PRECAST CONCRETE FLOOR SLAB with some new features has been developed by J. William Cornelius of Jacksonville, Fla., after five years of experimentation. Mr. Cornelius, a Carnegie Tech graduate, is a construction superintendent who has supervised erection of some of Jacksonville's leading structures, including the Federal Building, the multi-story St. Johns Apartments, and the new Independent Life Insurance Building, a 19-story downtown office structure. He is also developer of the Radaire heating and cooling system.

Known as Structoblend, this colored concrete slab is being produced for him by the Pre-Cast Concrete Products Co., Jacksonville. Claims made for it are these:

1. More resistant to wear and scratching than ordinary concrete slabs.
2. Easy to clean and kept new looking regardless of volume of foot traffic.
3. Can be installed with common labor, requiring only a simple setting and grouting.
4. Can be installed regardless of weather conditions.
5. Eliminates the necessity of using air ducts for under-the-floor heating and cooling.
6. Moisture problems due to capillary movement of ground water are eliminated because the floor system is not in contact with the ground at any point.

A single color or a blend of colors, as may be desired, is applied to the face side of the floor slab to a ¼-in. thickness, with the mold in inverted position. Lime-proof dry colors made by the Smith Color & Chemical Co., New York, N. Y., are used after being mixed to the proper consistency. A portland cement backing is applied to the color face immediately after face colors are vibrated. There is no absorption of color into the main body of the slab. It is possible to mix several colors in any desired blend or several colors can be used for a variegated effect. When the slabs have been set in place, a terrazzo seal is applied to sharpen the colors. The addition of color, Mr. Cornelius said, adds little to the cost as compared with a natural precast concrete slab.

The slabs are 4 ft. square and weigh 300 lb. each. They are 3 in. thick around the edges and have a 3 in. thick flange at the center line. The field is only 1⅜-in. over the body of each slab. A ⅜-in. diameter reinforcing bar around the outside and across at the center line with style 44-1010, galvanized welded wire fabric* is used as standard reinforcing in each slab.

Most of the trouble in perfecting the fabricating process was in developing a production mold that was economical and could be handled by common labor. With the assistance of the Pre-Cast Concrete Products Co., Mr. Cornelius finally came up with one which solved the problem. The system and molds have been copyrighted but not patented.

For quick setting, high-early strength cement is used. Within three or four days after casting, the slabs are ready for installation.

Despite their size and weight, they can, according to Mr. Cornelius, be

(Continued on page 216)

J. W. Cornelius, construction superintendent, who developed colored concrete floor slab

*This is the technical description recommended by Wire Reinforcement Institute for 4 x 4 in. mesh, No. 10 gauge wire.

Partial view of the Siporex de Mexico plant in Mexico City

First SIPOREX Plant in Mexico

• Siporex de Mexico, S.A. now producing lightweight masonry units, wall, floor and roof slabs for every type of building construction from small houses to office structures. Capacity is 1,000,000 cu. ft. per year

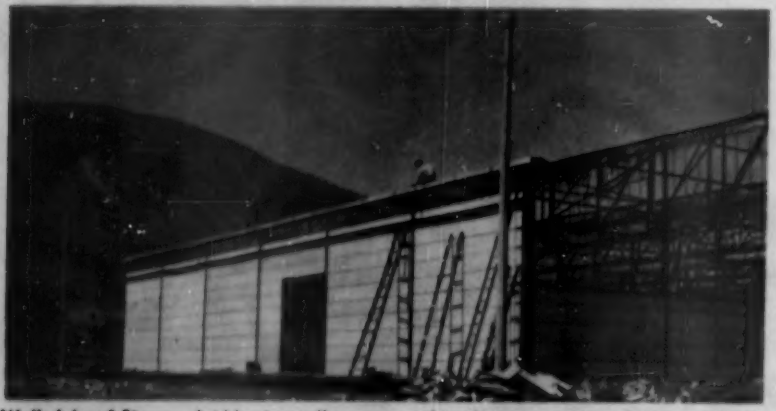
By PEDRO ALBIN, JR.

To Mexico goes the distinction of having placed in production the first Siporex plant outside of Europe. This plant, built by Siporex de Mexico, S. A., was completed just ahead of the plants in Montreal, Canada and Caracas, Venezuela and the plant in Leopoldville, Belgian Congo, in the very heart of Africa.

A group of Mexican businessmen, well aware of the trend towards lighter building materials, joined hands with industrialists in the United States and Europe, to construct the first Siporex plant in the little village of San Bartolo Naucalpan, State of Mexico, just six miles outside of the sprawling Mexico City.

The plan called for a factory with an initial output of about 1,000,000 cu. ft. per year, costing about $300,000 (U.S. currency) in machinery and $150,000 in buildings. The plant is conceived for a future expansion of up to about 6,000,000 cu. ft. per year. For this purpose, the new company acquired a site of about 9 acres, sufficient for any future expansion. Construction started at the end of 1953, and the first Siporex was cast in December, 1954.

In the middle of February 1955 Siporex de Mexico revealed its product to the public for the first time in a press conference given at the "Casa del Arquitecto" (the house of the architects). Tests were undertaken to show the press the strength, fire resistance, workability and other advantages of the material.



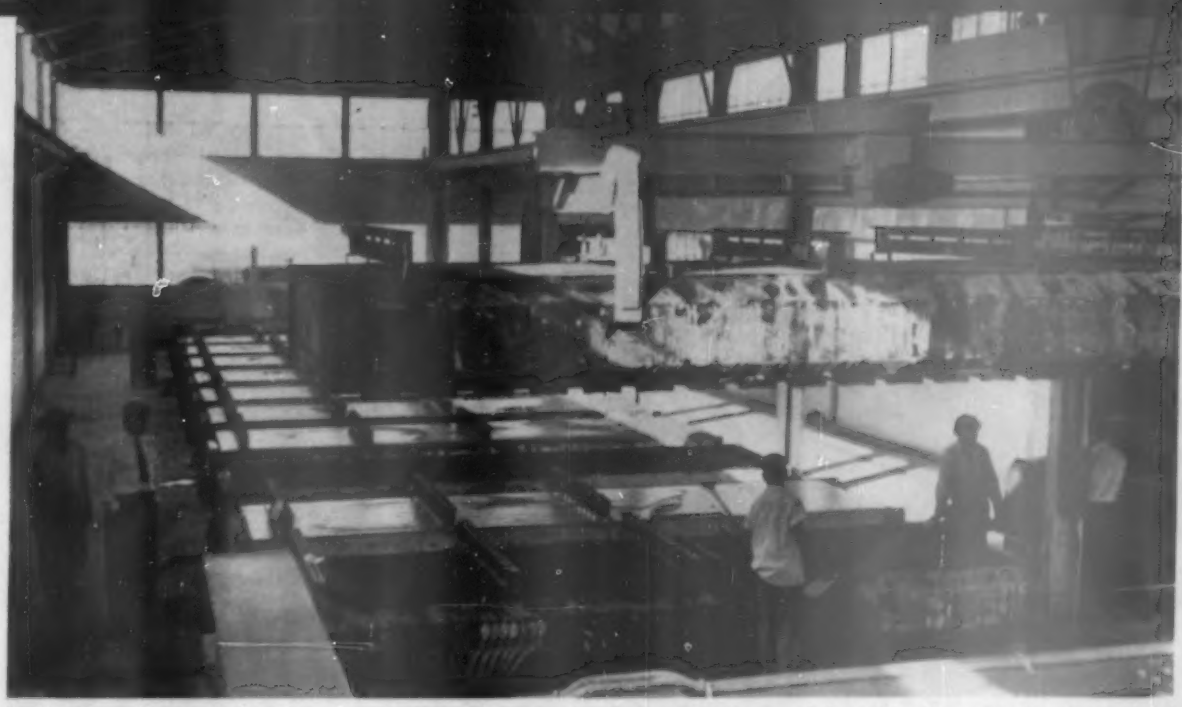
Wall slabs of Siporex, laid horizontally, were used in the construction of the new Goodrich tire plant

At the end of February the inauguration of the Siporex plant took place. Some 500 guests were greeted with the sound of fire crackers and one of the best known "mariachi" bands. They were shown the plant in operation, witnessed the pouring of the material as well as the cutting and curing, and then were treated to refreshments and a typical Mexican lunch. The Governor of the State of Mexico, Salvador Sánchez Colín, made the inauguration speech. Industrialists and bankers also were present, including such outstanding personalities as Perez Duarte, Undersecretary of the Economic Department; Ramirez Vazquez, president of the Mexican Society of Architects; Evaristo Araiza, general manager of Monterrey Steel Works; Ramiro Alatorre, general manager of the Industria Eléctrica Mexicana (Westinghouse Electric in Mexico); just to mention a few of them.

As Mexico City, the capital, has a grave land-sinking problem, averaging about 12 in. a year, the use of lightweight building materials has become increasingly important with the trend toward "skyscraper" construction.

Siporex proved an answer to this problem as the weight of a building, including foundations and structure, could be reduced about 50 to 60 percent.

Briefly, Siporex is a structural ma-



Looking toward one end of casting room showing workman pouring Siporex mix into one of the molds. Above may be seen overhead crane to handle filled and empty molds

terial available in slabs, lintels and blocks which have a high insulating factor. It is as light as wood but has the characteristics of stone and is incombustible. It can be nailed, sawn or drilled with woodworking tools. It is a factory made unit produced under controlled conditions with a highly mechanized process resulting in the product of uniform quality.

The process causes silica and cement or lime to combine chemically in cellular form. The characteristics of this chemical compound — monocalciumsilicate — and the cellular structure, account for the light weight — strength ratio, its high thermal insulation, low shrinkage and moisture absorbancy.

All the raw materials are available in Mexico. The sand comes from the nearby "Palacios" pit. It is a "blue sand" of volcanic origin. Normal portland cement is supplied by the nearby "Tolteca" Cement Co. The water comes from a deep artesian well.

Manufacturing Steps

Sand is ground to a slurry of the proper fineness. This slurry is stirred in silos together with activating chemicals for a certain period of time after which it is mixed with cement and various chemicals in a special mobile mixer. The casting is made in molds or steel pans of a design suited to fit into the wire cutting machine where the material will later be cut into slabs, lintels or blocks. The molds in the new plant are 18 ft. long, 5 ft. wide and 20 in. high.

The first chemical reaction that takes place in the Siporex mixture is a development of hydrogen gas, which creates the uniform cellular structure in the material. The mold contents simultaneously rise for a period of about half an hour until the mold is completely full. The product is now left to set for some hours until it has reached the consistency of cream cheese. The mold is then transported with an overhead travelling crane to the cutting machine. Here the sides of the molds are automatically removed and the 18 ft. long cake is precision cut by wires in length, cross and horizontal directions to the desired dimensions of the slabs, lintels and blocks. Cutting tolerance is 1/48 in.

If reinforced slabs or lintels are produced, spot welded reinforcement cages are placed in the empty mold prior to the casting and the wire cuts are made in between the separate reinforcement for the various slabs or lintels to provide an adequate covering of the reinforcing rods.

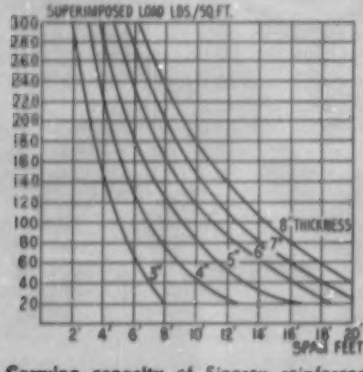
After the cutting operation is finished, the molds are assembled on wagons and moved 12 at a time into the autoclaves, where the material is cured with high pressure saturated steam for a number of hours. The total production cycle is about 30 hr., starting from the time the raw materials were mixed, until the Siporex material leaves the steam curing autoclaves and is removed from the molds ready for use. The finished product can be loaded on trucks and taken immediately to the building site.

Materials made by Siporex de Mexico include reinforced as well as unre-

Government officials and leading industrialists of Mexico watching pouring operation. From left to right, next to workman: Salvador Sanchez Colin, Governor of the State of Mexico; Perez Duarte, Under-secretary of the Department of Economy; and the author, Pedro Albin, manager of the plant who is explaining the steps in manufacture of Siporex

House under construction in Acapulco, Mexico, using Siporex slabs. Note how slabs are tied together by nailing

inforced slabs and blocks for lintels, roof, wall and floor construction. They are used for fire protection of steel



Carrying capacity of Siporex reinforced slabs of 31 lb. dry density. All slabs are designed for deflection less than 1/360 span due to superimposed load. Slabs of density 45 lb./cu. ft. carry about 30 percent higher loads than shown above

structures and for thermal insulation.

Reinforced slabs are 20 in. wide, a thickness that can be varied from 2 to 8 in. with a modulus of 1 in., and a maximum length of 18 ft. Block are made to the desired size and thickness. All these materials are actually tailor-made for the use to which they will be put.

The density of the material can be determined in the process to obtain 25, 31, 37 or 44 lb./cu. ft., about ⅛ to ⅓ of the weight of ordinary concrete.

Most of Siporex de Mexico's production is reinforced products; such as lintels, roof, floor and wall slabs.

Roof slabs weigh 31 lb./cu. ft. The slabs provide outstanding insulating properties, the conductivity being 0.81 B.t.u./sq. ft. hr. F. in. The roof slabs are designed so that the deflection due to superimposed load does not exceed 1/360 of the span.

Floor slabs have a density of 31 or 44 lb./cu. ft. and are designed according to the span and the superimposed load. They are suitable for residential, commercial and industrial buildings. Erection is rapid and simple. The slabs are laid directly into place and building time is therefore considerably reduced as compared to older methods.

Siporex wall slabs serve as insulating structural members, 3 to 8 in. thick. Their dry density is 31 lb./cu. ft. The large, lightweight slabs, up to 18 ft. in length, are easily erected, cutting building time by two-thirds to three-fourths as compared with conventional methods.

Siporex wall slabs are ideal for partitions, normally 3 in. thick, and reaching from the floor to the ceiling. Such walls only require 1/24 in. plaster for a perfectly smooth finishing, whereas outside walls are normally painted.

Lintels are delivered from the factory ready for erection. They are from 3 to 10 in. wide, 10 in. deep, and the length varies from 3 to 12 ft. Longer lintels can be supplied when required. The lintels are made to sustain a load from 400 to 1000 lb./ft.

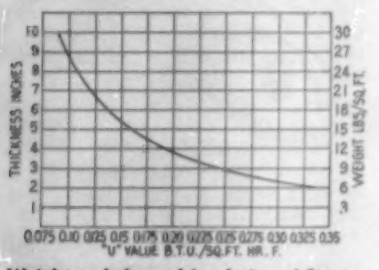
The most common un-reinforced materials produced in Mexico are building block and slabs for fire protection of steel structures. Another application of un-reinforced slabs is for suspended ceilings.

Block can be made to any size desired by the customer, however, the standard sizes are 10 x 20 in. with 3 to 10 in. thickness. Block weigh 25, 31, 37 and 44 lb./cu. ft. The crushing strength of the Siporex block varies from 280 p.s.i. to 700 p.s.i., depending upon the density.

Finally, in Mexico many modern buildings, using suspended ceilings, have turned to Siporex for fire protection and also much better sound absorption.

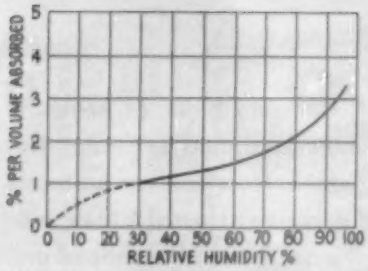
The policy of Siporex de Mexico is to furnish the Siporex reinforced slabs so priced as to give to the builder the same cost for a finished roof, floor and wall as when built in ordinary concrete or brick.

The saving in weight is particularly important in multi-story buildings. Whereas a floor of 14 ft. span designed for a superimposed load of 60 lb./sq. ft. normally requires a 5-in. concrete deck weighing 60 lb./sq. ft., a 6-in. floor of Siporex of the same span and load will only weigh 18 lb./sq. ft. The dead weight of such a floor will therefore be reduced by 70 percent when Siporex is used. In a



Weight and thermal insulation of Siporex reinforced slabs of 31 lb. dry density

A wall of Siporex block in the new hospital of the Polytechnic Institute in Mexico City



Absorption of water from atmospheres of various relative humidities for Siporex of 31 lb. dry density

similar way, the weight of outside walls and partitions are reduced by one-half to two-thirds.

If we compare a ten story building either made with Siporex roof, floor and wall slabs or with conventional materials, the total saving in Mexico when using Siporex is estimated to be about 20 percent of the total cost.

Low Cost Houses In Mexico

Like many other countries, there is a problem in Mexico of providing good quality but inexpensive housing. Such houses are built entirely with Siporex slabs of 31 lb./cu. ft. dry density. The wall and roof slabs will be 4 to 5 in. thick with partition wall slabs 3 in. thick. The Siporex slabs are sent pre-cut from the factory to the site, where they need only be assembled. No skilled labor is required and the home builder can do most of the work himself. The wall slabs are nailed to each other and jointed with mortar. Window and door frames are nailed to the walls and piping conduits are easily chased by hand. The outside walls are painted and the inside is finished with a skin of plaster about 1/24 in. thickness. The roof slabs are mortared together, waterproofed on the top with any conventional material, and painted on the underside. There is no need for form work, no pouring, no mixing, no cutting and adjusting reinforcing iron; all is done in dry building with precut slabs. More than 50 percent of the labor can be saved.

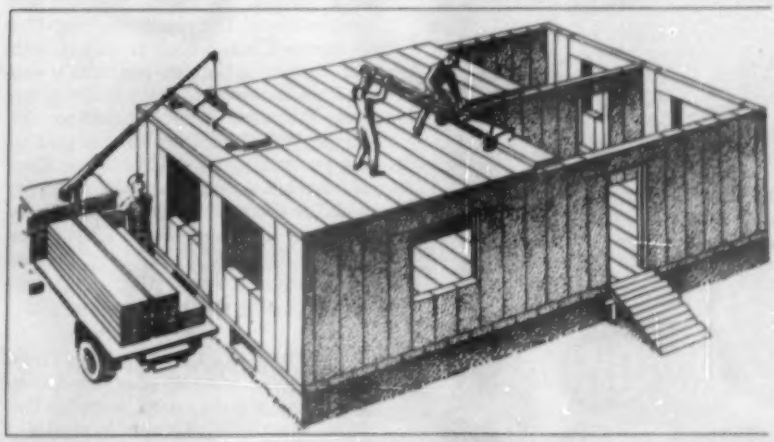
A roof slab being put in place in a low-cost housing project

Some Outstanding Jobs

The first sales were made early in 1955 for the extension of the Goodrich tire factory. The construction included: horizontal wall slabs of 31 lb. density with a span of 15 ft., and 5-in. thickness; partition walls having an 8-ft. span and 3-in. thickness; and roof slabs with spans of 9 and 12 ft. and a thickness of 4 in. Another order was for roof slabs of 31 lb./cu. ft. of 15 ft. span for the new "Canada Dry" plant in Cuernavaca, the charming resort town south of Mexico City. The new Sears, Roebuck store in Mexico used Siporex roof slabs. Other orders were placed for houses, as far away as Acapulco. Siporex de Mexico has received orders from the Mexican Telephone Co., from Diesel Nacional (the vast project undertaken in part by the Italian Fiat Co. in Irolo, State of Hidalgo) and by the Federal Health Department and many others.

These customers either signed a contract or the material was already delivered at the time this article was written, only a few weeks after production started.

Although building with Siporex is a comparatively simple matter, Siporex de Mexico felt that during the introduction of the material some advice should be given to the customers. Therefore the Siporex plant in Mexico has a complete technical staff advising how to build with Siporex. This staff prepares drawings of buildings and houses with Siporex material, and calculates weights for structures and foundations, etc. Also a Siporex service engineer will be available at the building site, without any cost to the customer, to advise the contractor on how to use Siporex material.



Showing method of erecting low-cost housing with floor, wall and roof slabs of Siporex

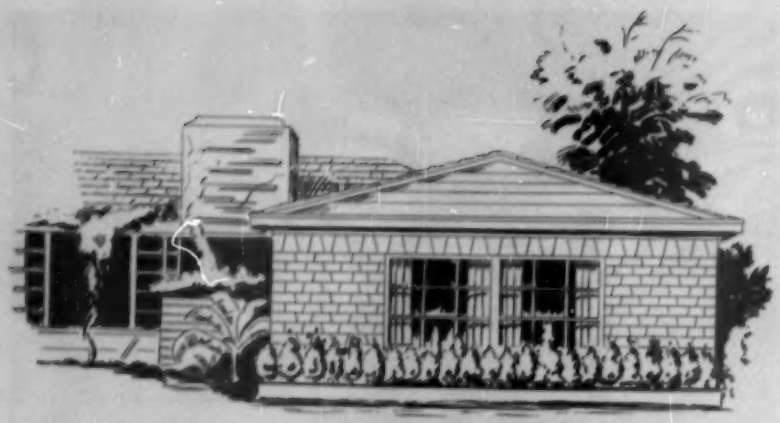
N.C.M.A. Technical Bulletin

NATIONAL CONCRETE MASONRY ASSOCIATION, in its Technical Bulletin No. 2, discusses experience of companies using concrete releasing agents to facilitate cleaning of concrete mixers and also gives recommendations for repairing cracks in concrete masonry walls above grade. In addition, the bulletin reviews two recent technical articles, one dealing with exterior coatings for masonry and the other with concrete admixtures.

The first report was based on inquiries made of several member companies which are successfully using releasing agents. One company reported a more than 100 percent time saving in the cleaning operation through use of a releasing agent.

•

JONES-SCOTT CO. has begun operations at a ready-mixed concrete batching plant in Walla Walla, Wash.



Attractive appearance of house constructed with angle block units

• Concrete block of keystone shape designed by Miami, Fla. dentist. New unit can be made on conventional block machines. The wedge-shaped unit introduces a new concept in ornamentation adapted from ancient architecture

Design Keystone-Shaped Concrete Block

IN RECENT YEARS many innovations have been introduced in the building industry which have resulted in lowering costs of construction and increasing the strength and durability of structures.

Throughout this period of architectural experimentation and change the basic unit of construction has remained the same; namely, the concrete block.

Recently in Miami, Fla., a revolutionary change in the shape of the age-old concrete block was introduced by Dr. E. H. Fogerty, a retired dentist. The new type unit is called the Fogerty angle block, and differs from the conventional rectangular block because of its keystone shape.

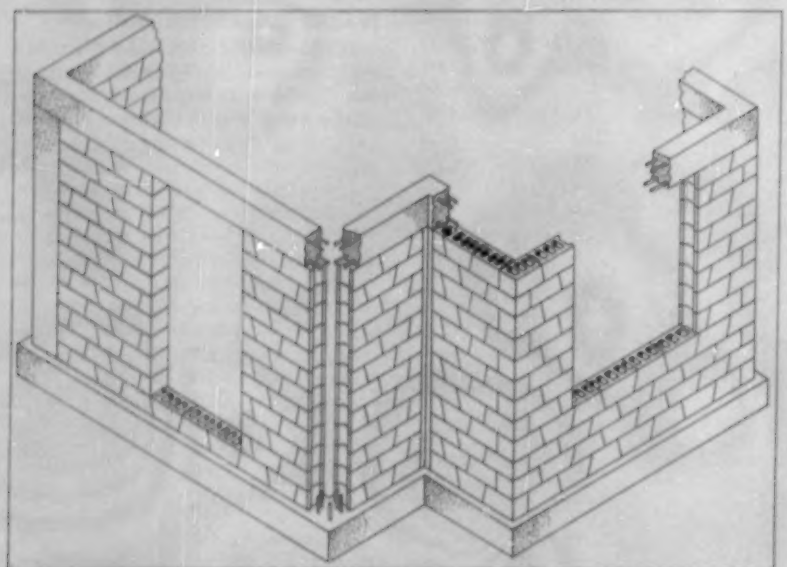
The principle of the keystone block in architecture is not new having been used by the Chaldeans 4000 years before Christ. The early Etruscans then introduced it into European structural design, and it was later copied and used extensively by the Romans in the building of their monumental structures such as the aqueduct, the Pantheon, and the Colosseum.

Where the ancient builders utilized the wedge-shaped block primarily in the building of arches which were locked in with a keystone at the apex, Dr. Fogerty has fashioned all of the blocks wedge-shaped, providing keystones in every course as shown in the accompanying sketch.

This block can be used in any type of construction where the conventional block is now being used, and locking in every course with angle block will double the strength of a structure, the inventor claims.

The artistic patterns resulting from the laying of the keystone angled block give an exterior wall an ornamental effect and there is no need to apply stucco over the block, according to the inventor.

Dr. Fogerty claims the new block will provide greater strength and durability in the construction of residential and commercial buildings at no additional cost. The block can be made with conventional block machines.



Showing details of angle block construction

Concrete Glue

CONCRETE INCORPORATED, St. Louis, Mo., in its official publication "Concrete Facts," reports the successful use of a new product used in applying a thin concrete topping over a concrete floor without having to roughen the undersurface. The product is Pree-Mix Concrete Glue, which is mixed with the topping (1 quart per sack) and also applied over the old surfaces before the pour. The publication describes the application of the glue in the resurfacing of the backstage floor of the Municipal Opera in order to make it perfectly level. The thickness of the new surfaces varied from paper thin to one inch thick. It is claimed that even the paper thin areas will never chip or crack.

•

THE ROBERTS CO., Crestline, Ohio, is producing precast, prestressed concrete bridge units on an assembly-line basis. Charles E. Roberts is president of the company.

Air-entrained concrete costs less with ERTRANE® C because...

With ERTRANE C, no losses in handling or storage
you use ERTRANE C either dry or in solution
ERTRANE C needs no caustics
ERTRANE C is 100% active

You're going to save real money per cubic yard of air-entrained concrete when you use Ertrane C, Nopco's quality air-entraining agent.

Here's how you save, as proved in practice by leading cement manufacturers and concrete mixers:

1. No caustics needed. Unlike some powdered additives, Ertrane C makes a uniform solution in either hot or cold water, *without* adding caustics to neutralize.

2. Ease of handling and storage. Ertrane C is packaged in a 60-lb. multiwall bag. No danger of freezing or caking.

3. Lower freight rates. Ertrane C is 100% active; you are not paying freight on water.

4. Flexibility of use. Ertrane C can be used either dry or in solution. 3 bags (180 lb.) of Ertrane C into 125 gallons of water makes a 15% solution.

Write today for complete information on Ertrane C. Nopco Chemical Company, 606 Industrial St., Harrison, N. J.

NOPCO

PLANTS: Harrison, N. J.
Cedartown, Ga. • Richmond, Calif.

Three of the 15 mixer trucks which are dispatched by two-way radio equipment

TWO-WAY RADIO
A Big Ready-Mix Sales Advantage

• Suburban Ready-Mix Co., representing a group of south Chicago suppliers, employs A. Elsinga Cartage Co. to haul concrete on contract. Uses Citizens Radio Band on 461.7 mc. frequency

By JOHN M. VANDERBILT*

IF A DRIVER OF A CONCRETE MIXER TRUCK cannot deliver his load within 3 hr. he must dump it anyway, anywhere he can, before it hardens.

Until the A. Elsinga Cartage Co. installed Motorola two-way radio in October, 1954, exactly this sort of thing happened all too frequently. Each dumped load represented a loss of between $54 and $72.

Today, all 15 transit mixers and four additional vehicles operated by the company are radio-controlled, and elimination of "dumped loads" is by no means the only savings.

*General Manager, A. Elsinga Cartage Co., Chicago, Ill.

Two-way radio has given the company complete control over the trucks, and we feel that this is responsible for the big improvement in our service and overall efficiency during the past six months.

Improve Service

Before two-way radio was installed we had too many instances of broken delivery promises, but in this respect we were no worse than any other ready-mixed concrete supplier who operates without radio. In a typical instance, our dispatcher would send out a truck-load on an urgent order for, say, 6 cu. yd., only to have the driver telephone an hour later to report his truck broken down miles from its destination. Perhaps the driver had to leave his truck and walk a considerable distance before finding a telephone, wasting sometimes as much as ¾ hr. just letting the dispatcher know about the break-down. If it was below freezing, the load almost certainly had to be dumped because the concrete, with chloride added to set before its moisture content freezes, begins to harden in about an hour instead of the normal 3-hr. time limit.

By contrast, when a truck breaks down or gets stuck today our driver doesn't even leave his cab. He merely

Rugged Y-260 speeds yard operations at Sherman Concrete Pipe Co., Knoxville, Tenn.

Sherman Concrete Pipe knows . . .

BIG LOADS MEAN BIG PROFITS

Concrete pipe with diameters of 7 feet, and weighing 20,000 lbs. is a big load . . . calls for big, rugged equipment. Sherman Concrete found the Clark-Ross Y-260 met the test—released 8 to 10 men for more productive work, speeded operations, increased their profits.

Rugged terrain, mud, bad weather are no problem for the Clark-Ross Y-260. Balanced weight distribution and large sized tires guarantee positive traction. Low center of gravity combined with a high under-clearance of 10" gives exceptional operation on rough terrain. And for maneuverability the Y-260 can't be beat. The shaped rear counterweight of the Y-260 is especially designed to reduce overhang in turning, to give a minimum of tail swing.

Here's a truck that offers outstanding traction and maneuverability . . . with big load capacity. Call your local Clark dealer for details on how the Y-260 can increase profits in your operations. He's listed in the Yellow Pages under, "Trucks, Industrial."

CLARK EQUIPMENT

Industrial Truck Division **CLARK EQUIPMENT COMPANY** Battle Creek 60, Mich.

All orders to radio-controlled mixer truck fleet transmitted through Mat Rogers, central dispatcher

presses his microphone button and reports the situation to the dispatcher. In less than 2 min. help is on the way, and at the same time another truckload is dispatched to the waiting customer. Almost always it is possible to get the stalled truck back in service soon enough to save the load by delivering it to an alternate destination radioed to the driver as soon as the truck is rolling again.

Operating Economies

In addition, there is a clear saving of approximately $193 per month on telephone tolls alone, figuring approximately $3 per driver each week.

When this saving is totalled up along with the others mentioned above, it is easy to see how two-way radio is literally paying for itself.

Our Motorola two-way radio system has given reliable performance from the first day it was installed, and also has resulted in the following positive benefits:

1. An increase in overall efficiency of at least 50 percent.

2. A 60 percent reduction in driver over-time costs.

3. A steadily climbing tonnage volume because customers are learning that radio-equipped mobile mixers can almost always deliver a load on short notice, any time during the working day, under any and all conditions.

4. The almost complete elimination of routine operating errors. The few we do have can be corrected instantly when either the driver or the dispatcher discovers the mis-cue. There is never any mix-up over destination or delivery address.

Radio Installation

The Elsinga Cartage Co., which hauls concrete on contract for a group of south side Chicago suppliers who have combined their operations under the name Suburban Ready-Mix Co., makes use of the Citizens Radio Band. The 18-watt RF output base station transmitter and the mobile units in the trucks, which are identical, operate on a frequency of 461.7 mc. Although the power is relatively low, our communications with all trucks have been faultless and without interruption throughout the 20-mile radius in which we operate.

This blanket coverage of our 1000-square mile service area, with reliable communications everywhere at all times, was achieved through painstaking system engineering conducted by Motorola at the time the installation was made. Particular care was taken in selecting a site for the base station transmitting antenna. After many measurements were taken, a location finally was obtained that provides loud, clear signals everywhere the trucks go. This site is on top of a feed mill approximately a mile from the central dispatcher.

The base station transmitter is located there, close by the coaxial type transmitting antenna, and is connected in an integrated system not only with the central dispatcher at the plant, but also with two other remote control dispatching points located at our garage and general offices several miles distant.

General manager, John M. Vanderbilt, giving instructions to truck coming in for repairs. This remote consolette, and the one in the office, are integrated with the main dispatch point at the yards

Although the majority of radio traffic flows in and out of the central dispatcher's office, the other remote control points add great flexibility to our truck fleet communications.

Management can be called directly by foremen for an on-the-spot policy decision, special orders can be given, or the maintenance chief can be contacted directly when a truck needs help. The dispatcher at the maintenance garage also directs the trucks as they leave in the morning and return at the end of the day.

In addition to our 15 transit mixers that deliver ready-mixed concrete, two-way radio units have been installed in a company executive car, a maintenance truck and in two tractors which are used both for excavating jobs and for assisting truck mixers that are mired in mud at construction sites.

Outline for Safety Program

NATIONAL CONCRETE MASONRY ASSOCIATION has prepared a suggested outline as an aid to management in organizing a safety program in a concrete block plant. The program covers management responsibility, plant inspection (including housekeeping, guarding equipment, electrical hazards, yard hazards, and the like), and employee education. The need for an organized safety program was given added incentive by the results of the recent safety contest, which indicated there is lots of room for improvement in the industry. All members are urged to join in the drive for greater plant safety by establishing and maintaining an active safety program.

Concrete Railroad Ties

PREFABRICATED REINFORCED-CONCRETE RAILROAD TIES are being laid at various points in Israel. Fifty thousand concrete ties are being manufactured for Israel Railways by Higdal Ashkelon. The ties are said to be 20 percent cheaper than the wooden or iron ties normally used.

Selling to Architects

THE NATIONAL CONCRETE MASONRY ASSOCIATION has published a reprint giving the concensus of 20 salesmen interviewed on the most effective methods of advertising and selling to architects. The reprint, entitled "Get to the point—sell 'em soft," is available from the Association at 38 S. Dearborn St., Chicago 3, Ill.

Columbia 12" HIGH

TESTED, PROVED and ENDORSED by the Concrete Block Industry

Columbia 12"-HIGH enables you to INSURE YOUR BUSINESS FUTURE with one concrete block machine! Your first cost can be low...you buy only the molds you need for today's production of standard block. Then, when you see a chance to step into the growing market for 12"-high specialty units, YOU'RE READY! Order the molds you need, and you're in business!

COLUMBIA 12"-HIGH MAKES

all standard 4", 6" and 8"-inch block, as well as a wide variety of 12"-high shapes, including drain tile, silo staves, water meter boxes, flue liners, etc. We will also make molds to order for special 12"-high face block units.

HERE'S ANOTHER IMPORTANT FEATURE:

All 12"-HIGH machines are now equipped to take 18½x26-inch pallets, as well as standard plain 18x20-inch pallets. YOUR PRESENT RACKS AND PALLETS CAN BE USED ON YOUR NEW 12"-HIGH MACHINE.

Columbia MACHINE

Home Office: 107 S. GRAND, VANCOUVER, WASH.
Factory Branch and Warehouse: Mattoon, Illinois

World's Longest Highway Bridge Is Prestressed Concrete. The roadway of the Greater New Orleans Expressway crossing Lake Pontchartrain is being layed with concrete slabs 56 feet long and 33 feet wide precast with curb and gutters and prestressed with 175 separate Tufwire Strands.

Engineers See Tremendous Future for Prestressed Concrete as Present Uses Multiply at Fast Pace

The use of prestressed concrete in scores of structures from parking lot curbs to giant bridges and warehouses is increasing at a tremendous rate. Starting just about from scratch a few years ago, prestressed concrete construction during 1955 totaled up to millions of square feet.

Prestressed concrete is finding a wide range of uses in highway bridges, trestles, docks, piers, highways, airport runways, shopping center facilities, schools, gymnasiums, stadiums and a rapidly growing list of residential, commercial and industrial buildings. A look at the "small item" end of the list turns up such products as movable curbs for parking areas, light poles and sign standards, fence posts, and many another product to suggest the field of uses is about as unlimited as the imagination of engineers and business men.

Advances in the development of better high tensile strand and wire for tensioning the concrete are in large part responsible for this trend to prestressed construction. Architects and engineers have known for a long time they could apply this principle and save substantial amounts of concrete and steel required for the same structure in reinforced concrete. Longer spans, less deadweight, and lighter foundations were some of the specific benefits to be gained. As soon as the problem of dependable tensioning materials was whipped, the way was opened wide to the present boom in prestressed construction.

The research and production facilities of Union Wire Rope Corporation have been geared to the seven-league strides of prestressed construction since the trend began shaping up some ten years ago. Our expanding plant capacity and central location in Mid-America have made us the ideal source of supply for the strand and wire that form the "tendons" of prestressed concrete.

Prestressing offers opportunities not only to large-scale contractor and constructor, but also to the fabricator of smaller concrete products of every description. The owner of even the smallest business of this latter nature may have much to gain in letting us help him explore the possibilities of prestressing in his product. We'll welcome the invitation.

You Can Be Sure of a Source of Supply

when you specify

UNION Tufwire®

Wire & Strand

...for ANY SIZE Prestressed Concrete Job!

The jobs don't come too big or too small for on-schedule supply of Union *Tufwire* (Wire or Strand) — whether it's for the world's longest highway bridge (pictured above) or a one-story building. Even though the demand for *Tufwire* has taken mighty big strides ahead, we stay ahead of present demand, and we're geared for the future.

What's more, we place at your service the foremost staff of engineers and technicians, and the most advanced research laboratory in the industry. We have the know-how for the big jobs and sincere interest in the smallest ones. Call on us for counsel.

MAIL THIS COUPON TODAY!

Union Tufwire Strand may be ordered in coils or in reels.

union Wire Rope corporation

Specialists in high carbon wire, wire rope, braided wire fabric, stress relieved wire and strand.

2302 Manchester Avenue, Kansas City 26, Missouri

FREE!

Concise, authoritative handbook covering the subject of prestressed concrete, complete with tables of Union **Tufwire** specifications.

Please rush my free copy of the Tufwire Book.

MY NAME _____ TITLE _____

COMPANY NAME _____

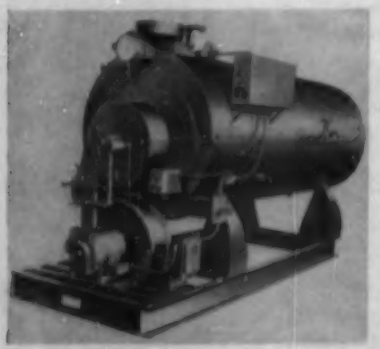
ADDRESS _____

CITY _____ ZONE _____ STATE _____

NEW MACHINERY

Portable Traverse Saw

STONE MACHINERY CO., Manlius, N. Y., has developed the Jet 110 traverse saw for on-the-job cutting of stone, marble, brick, terrazzo, slate, granite, asbestos products, refractories, structural glass, concrete and concrete products. It has a 14-in. wheel diameter, and cuts wet or dry to a 5-in. maximum depth on surfaces up to 9 ft. or more in length. It has a wheel spindle speed up to 4000 r.p.m. maximum while idling and 2000 to 3000 r.p.m. under load conditions. A vacuum-type cooling system and helical gearing provide longer motor life. Various types of guide rails allow for flexibility and adaptability on the job, or planed heavy rails are available where a permanent set-up is desired. The machine weighs 83 lb.



Steam Generator

CYCLOTHERM DIVISION, National-U. S. Radiator Corp., Oswego 6, N.Y., has brought out a 40-hp. steam generator which measures 83¼- x 57¾- x 36½-in. The package steam generator delivers 1380 lb. of steam per hr., and 1,340,000 B.t.u. per hr., burning oil, gas or a combination of oil and gas. The automatic operation of the steam generator is controlled electronically, with the controls housed in a single box, mounted at eye level on the boiler shell for ease of maintenance. The unit requires no special foundation or stack.

Block Estimator-Ruler

ROBERT J. PATTON, JR., P.E., of Gainesville, Ga., has brought out a concrete block estimator and draftsman ruler designed to expedite the drawing and estimating of 16-in. concrete block structures. The scales on the ruler permit the architect to scale direct on the drawing, wall openings and corners to full and half block lengths. The building estimator can read direct the number of blocks per course for a wall, by placing the corresponding scale on the blue print. The Pattern Block Ruler is of triangular cross section made of kiln dried, straight grain white maple. The ruler is 12¾ in. long, and comes with ⅛, ¼, and ½ in. to the foot scales. Each scale is printed on a separate face of the ruler.

Concrete Block Unloader

HAVERSTICK BROS., 2111 Stone Mill Road, Lancaster, Penn., has brought out the "Hydra-Lift" concrete block unloader for truck mounting, which features a rack and pinion drive which moves an overhead carriage and the load with it. The drive is completely hydraulic, powered by the take-off from the truck engine. The unit unloads two cubes at a time, can unload into basements due to a 12-ft. load drop, and stacks cube upon cube.

Drop action of horizontal rails permits side loading with lift trucks. Normal carrying position of the rails is flat on the truck bed. When raised to act as guide rails, the bars facilitate unloading when the truck rests at a tilt.

Another feature is the hydraulically-operated, fold-down of the rear extension to provide a compact piece of equipment in transit. When extended for unloading, it provides solid supporting side braces for greater support strength.

Mobile Two-Way Radio

MOTOROLA COMMUNICATIONS & ELECTRONICS, INC., 4501 W. Augusta Blvd., Chicago 51, Ill., has brought out the "Twin-V" line of mobile two-way radio units which feature universal operation from either a 6 or 12-volt battery. Circuits and tubes designed for increased receiver sensitivity provide improved fringe area reception and greater range. An acoustically designed speaker is designed to improve intelligibility in two-way radio voice reproduction. Another feature is an "anti-clamp" squelch circuit which blocks the receiver when only noise is present, but clears the receiver for communications when a modulated carrier, even a weak one, is present. Both ignition noise and electrical "hash" are said to be effectively countered by circuitry designed for message clarity and interference reduction.

The line includes 6/12 volt d-c dynamotor powered models, as well as the all-vibrator versions. Equipment is available with standard power output ratings for operation in the 25-54 mc., 144-174 mc., and 450-470 mc. bands. No modifications are required to place the drawer unit in either a 6 or 12-volt vehicular installation. Conversion to split channel operation has been simplified by means of sealed-in plastic, guaranteed for life, interchangeable Permakay filters.

Transit Mixers

LETOURNEAU-WESTINGHOUSE CO., Adams Division, Indianapolis, Ind., has brought out a line of Westinghouse transit mixers, available in five sizes ranging from 4½- to 6½-cu. yd. capacity. The mixers feature a patented enclosed-gear drive for the drum, "double-action" mixing drum, ball-and-socket, self-aligning drum mounting, two-speed transmission and front mounting of Continental engines.

Another BESSER Booster

* This is the 124th of a series of ads featuring leaders of the Concrete Products Industry who are stepping up block production with Besser Vibrapac machines.

Well-known Brick Manufacturer Proves it Pays to Handle BOTH Brick and Block

The Washington Brick Company, in our nation's capital, learned from experience that a brick plant can substantially increase profits by producing and selling concrete block as well as clay brick. For many years, their brick customers had to go elsewhere for their foundation and back-up units. Thirteen years ago, with the upsurge of building construction, they decided to do something about it.

The company installed its first Besser Vibrapac machine in August, 1942. This initial machine was so satisfactory and, with the greatly increased demand for block, Washington Brick Company added four more Vibrapac machines — two in 1947, one in 1950 and one in January of this year.

Today, the company is in a good position to supply both brick and block . . . *material for the entire wall.* The high production of the dependable Vibrapac machines is an important factor in the company's success. Complete information on Vibrapac machines sent on request, without obligation.

BESSER COMPANY, Box 135, Alpena, Mich., U. S. A.
Complete Equipment for Concrete Block Plants

Washington Brick Company executives, (left to right) T. Somerville III, Pres.; R. S. Frazier, Plant Mgr.; J. C. Harding Jr., Exec. Vice Pres.

(Right) Close-up view of motel built with Vibrapac Block; all units supplied by Washington Brick Company. Note block on exterior walls are scored for decorative effect.

Sky-Lark Motel — one of America's most modern motels with 125 air-conditioned rooms and two swimming pools. All walls are Vibrapac Block constructed for maximum comfort and firesafety.

Battery of Vibrapac machines in the Washington Brick Company plant, Washington, D. C. Fully automatic. No machine operator required. Off-bearer merely guides the power hoist.

Exterior view of Washington Brick Company plant. In addition to standard building units, the company produces filler block for floors and roofs.

VISIT THE BESSER EXHIBITS at the Architects' Samples Corporation, 101 Park Avenue, New York City and the new National Housing Center, Washington, D. C.

BESSER VIBRAPAC

WORLD'S LEADING MANUFACTURER OF CONCRETE BLOCK MACHINERY

TRUCK MAINTENANCE

36. A producer views the ready-mixed concrete business. This is the first of two articles on mixer truck maintenance

By JAS. A. NICHOLSON*

WITH SO MANY MAKES, MODELS, AND SIZES OF TRUCKS being used by the ready-mixed concrete industry, with the number of trucking units varying from three or four trucks in a small fleet to more than a hundred in some metropolitan operations, and with maintenance facilities varying from a relatively few tools to a modern fully equipped garage, a discussion on truck care must necessarily be handled in a rather general manner.

At all operations, regardless of the above mentioned (and many other) variations, certain facts are basic. Trucks have to be kept rolling. Downtime has to be avoided. Deliveries must be made on time. Driver capabilities vary. Trucks take a beating. Mechanics must provide the trucks that the order department commits. Somehow, required maintenance work must be done. Whether jobbed out or done in the producer's own garage, trucks must be regularly serviced and necessary repairs promptly made. Operating and maintenance costs must be controlled.

One very successful midwest operator has made freedom from breakdown his major goal in preventive maintenance. Because his mixer trucks are always ready when needed, his company is noted for giving good service. When his trucks are garaged for major repairs, they are really given a complete overhaul. He doesn't replace a straggling part here and there; he replaces entire sections. This producer admits to abnormally high annual parts costs. He prefers increased parts costs and early replacement of mixer trucks to heavy maintenance expense and excessive down time. In all phases of his operations, including an outstanding safety program, Ralph Anderson of Columbus, Ohio, is one of the leaders of our industry. His approach to Preventive Maintenance problems is worthy of serious consideration.

Whatever the size of your operation, entrust the responsibility of fleet supervision to a topnotch key employe. Staff your garage with competent, industrious, self-reliant personnel. Allow maintenance employes sufficient time for their work. Make a careful selection of the man placed in charge of the tire care program. Demand that trucks be carefully inspected on each and every lubrication. Plan to carry out a regular year-round maintenance schedule. Whenever possible, make repairs before equipment breaks down. Plan ahead for major repairs and overhauls. Insist upon trucks being ready to roll when needed. Require

CAUTIONS TO MECHANICS

1. In making adjustments and repairs, in disassembling and reassembling parts, follow to the letter instructions set forth in maintenance manuals.
2. Use the right lubricant, at the right place, at the right time.
3. Without fail, change oil filter cartridges, and clean sumps at regular established intervals.
4. Before starting any repairing or overhauling work, get rid of dirt, hardened concrete, etc. to prevent contamination of oil and harm to parts.
5. On important repairs, if accurate gauges and micrometers aren't available to assure necessary close adjustments, take trucking equipment to a properly equipped garage.
6. Whenever you take any parts apart for cleaning and inspection, always replace any doubtful parts; e.g., never use old gaskets when reassembling a carburetor.
7. When cleaning seals, seats, shafts, etc., replace if damaged by wear, corrosion, tear, or scoring.
8. Know what parts should not be subjected to cleaning solvent treatment; e.g., starters, generators, seals, and rubber parts.
9. Avoid having new parts working in close relation with partially worn parts. Intelligently use the "parts kit" plan to spread out the time between major repairs.
10. To prevent excessive wear, keep end play within reasonable limits.
11. Keep front wheels in proper alignment to assure ease of steering and satisfactory tire performance.
12. When reassembling cylinder blocks, make certain that no abrasives remain in the engine.
13. To increase operating life of valves, maintain uniform gap clearance at or very near the minimum recommendation.
14. In reconditioning valves, obtain as nearly as possible, identical angles on the valve seat and valve face.
15. On a valve grind, install new valve springs, locks, guides, and rotor caps (set to a proper clearance).
16. When checking or repairing instruments, always have switch in "off" position — better still, unhook the battery.
17. On brake maintenance, keep brake movement at a minimum to lessen wear on the entire braking system.
18. If brake fluid is way down, just don't replace the fluid; make a complete inspection and correct the trouble before releasing the truck.
19. Replace brake linings before lining rivets are in such condition as to damage brake drums.
20. When strengthening truck frame for mixer mounting, start at rear of front spring and go as close as possible to center of tandem trunnion.
21. Carefully check frame and axle alignment of any truck that has been in an accident or otherwise severely jolted.
22. Whenever it is necessary to cut a truck frame, cut the side rail at a 45 deg. angle in order to lessen possible harm to the repaired frame.

*Pres., Nicholson Concrete Co., Toledo, Ohio.

BIG PROFITS FOR READY-MIX OPERATORS

WITH RCA TWO-WAY RADIO

Why are the leaders choosing RCA 2-Way Radio?

Most of them say they are impressed by RCA's fine service organization and the years of RCA leadership in radio and electronics. Look for these marks of quality: Superior crystals, tubes and microphones for plainer talking, longer life . . . heavy-gauge steel case for rugged service . . . color-coded tuning for simplest maintenance . . . expert service by RCA Service Company to assure peak performance.

You are always in touch with your drivers when agitator trucks and supervisors' cars are equipped with RCA 2-Way Radio. As a result . . .

- Trucks can be re-routed in emergencies, avoiding delays and losses, increasing profits.
- Plants can close earlier and users report savings in overtime up to 20-30% per month by knowing in advance when the last truck will be in.
- Trucking productivity is vastly improved . . . 10 trucks radio-equipped have been found equal to 11 trucks (or more).
- Telephone expense is reduced —you save money on every call you don't have to make.
- Faster service you can render makes a hit with your customers . . . it's a money-maker for them . . . business-getter for you.

RCA DISPATCHER 2-WAY RADIO TO DRIVER

Get the whole story—Mail Coupon

RCA

RADIO CORPORATION of AMERICA

COMMUNICATIONS EQUIPMENT

CAMDEN, N. J.

Radio Corporation of America, Communications Equipment

Dept. Z-206, Building 15-1, Camden, N.J. In Canada, RCA VICTOR Company Limited, Montreal.

☐ Please send me complete information on the use of 2-Way Radio in Ready-Mix Operations.

☐ Have an RCA Communications Specialist make a free RADIO SURVEY of my business.

NAME _____ TITLE _____

COMPANY _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____

drivers to make daily inspections and reports. Maintain an adequate parts inventory. Provide necessary tools and equipment. Effectively control maintenance expense.

In the ready-mixed concrete industry no producer can afford both high maintenance costs and excessive down time. The way out is through an effective preventive maintenance program. Some key employe always has to lead the way. In large companies, the equipment superintendent generally has the responsibility; in small concerns, it is up to a mechanic or the head mechanic. Always important is full support from top management.

An efficient top maintenance man demands daily operating condition reports from drivers. These reports are carefully studied and repairs promptly made. Regular checks are made over each driver's performance record. Careless, incompetent drivers should be given the opportunity to improve. Men who fail to improve their work should be released. Serious maintenance trouble may stem from faulty operation of equipment by drivers. A follow-up by an alert mechanic can stop such abuses. On two trucks we were experiencing considerable valve trouble. At the mechanic's suggestion, the two drivers were replaced. Valve difficulties ceased. With new carefully selected drivers, the two trucks have been in daily operation. We are convinced that the replaced drivers, hoping, because of their seniority to get new equipment, were actually trying to make the two trucks look bad.

For a Preventive Maintenance Program to succeed, there must be "team work" and "follow through." From the greaser to the boss, full cooperation is a "must." Mechanical knowledge and experience won't suffice if the men don't work together. The key employe given the responsibility for truck maintenance must be the reliant, determined type of individual who always sees things through. With him, having equipment running when needed, must be an obsession — he never quits until a job is done. With the right kind of top maintenance man, neither drivers nor customers will make a practice of abusing your mixer trucks.

In the early days of setting up a Preventive Maintenance Program, a producer shouldn't expect too much headway on the problem of cutting maintenance costs. Getting the equipment rolling and keeping it rolling are the first all important jobs. The primary objective is the lowest possible minimum hours of down-time when trucks are needed. Always the first hurdle is to pick up on what has been left undone. There are generally so many jobs to be done, that it is most difficult to decide where to start.

The wrong kind of trucks have been purchased. Trucks are manned by incompetent personnel. Trucks and mixers haven't been kept clean. Tires haven't been properly matched. Equipment hasn't been regularly lubricated and serviced. Most of the trucks and mixers are far from being in good operating condition. Maintenance personnel is lacking in both depth and ability. No records have been kept. Adequate tools and garage facilities aren't available.

As we started our Preventive Maintenance Program, we had to face the fact that our trucks had been taking a real beating on jobs — too much, unnecessarily. Drivers had tried to take trucks into places where tanks would have trouble going. Units had been pulled and even pushed about by bulldozers. Everything seemed out of alignment. On this matter, mechanics could only go so far — the real solution had to come from cooperation between our drivers, dispatchers, field representatives, and our contractor customers.

To make any progress at all toward our primary objective of minimizing down-time we had to decide to take a good licking on high maintenance costs until a slow period would give us a breathing spell. Much repair work was turned over to outside garages. The problem of tire care was jobbed out. A sizable outlay of money was required for parts inventory. Many new tools had to be purchased. It was necessary to hire extra greasers and mechanics. A night shift had to be added. Previous neglect of past due repairs hindered every effort to plan ahead. Much of our planned preventive maintenance work had to be deferred or rescheduled.

The problem was serious enough with our own trucks. We faced an even more pressing problem on leased equipment. We had been leasing approximately 15 mixer trucks. We already had known that some of the leased trucks weren't being properly kept up in appearance. Examination also showed much of the leased equipment to be in deplorable mechanical condition. We experienced great difficulty in getting owner-operators to cooperate. Further study developed that some operators had previously been depending on our own mechanics to keep their equipment running. On much of this maintenance work, we had not been properly compensated.

We learned that one of our principal problems was parts inventory. Parts catalogs had been lost. Inventory was badly depleted. Parts on hand weren't tagged or otherwise identified. Too much time was being wasted in picking up parts. Often men weren't going to the proper places. In many cases, they didn't even know where to go for parts. We found that a single part was being replaced when judgment called for replacing a whole section. Investigation showed that in many cases, we had been buying parts at a higher cost from undependable sources. Two points became crystal clear: — (1) Men must know parts; (2) it is very important to tie up with suppliers who are capable of furnishing standard parts in a hurry.

A real shocker came on several tandem units. This equipment had been furnished by a Western manu-

(Continued on page 218)

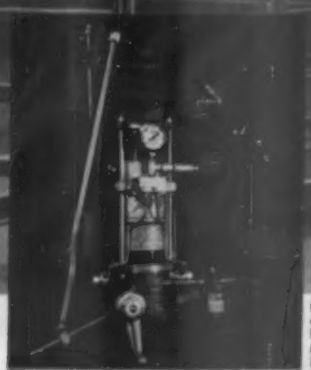
QUICK TROUBLE SHOOTING

Example A

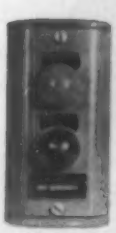
1. Feel clutch for free travel — check floorboard clearance.
2. Check brake pedals' travel — do they pump up? Service, if necessary.
3. Test emergency brake.
4. Press horn, check starter.
5. Depress fan belt — look for leaks.
6. Check radiator hose and connections for evidence of heating, rust, and leaks.
7. Presence of oil on engine or pan? Look for leaks.
8. Examine oil with dipstick. If oil dirty or level down, take action.
9. Check manifold for leaks.
10. Inspect all lights and signaling devices. Examine battery and cables.
11. Check generator starting rate.
12. Examine distributor points.
13. Tighten wheel lugs.
14. Kick tires or pound with an iron pipe. (Use pressure gauge if time permits or inspection raises doubt).
15. Check tires for bruises and mis-matching.
16. Rock front tires at top to check front end looseness.
17. Tie rod bent? Take a look!
18. Inspect driveline for looseness.
19. Look and feel for stretched or loose U bolts.
20. Check for spring and shackle breakage.
21. Examine truck frame for cracks and distortion.

AUTOMATIC LUBRICATION!

Another BESSER VIBRAPAC *Exclusive to Boost Block Production and Profits!*



(Left) Positive-feed pump mounted on outboard bearing support of VIBRAPAC machine. Starts and stops automatically with VIBRAPAC . . . eliminates human element.



Signal light indicator at pump. Shows all bearings have been properly lubricated.

Distributor junction blocks with lubrication lines installed on VIBRAPAC. Shows master feeder assembly and ¼" tubing for automatic lubrication of bearings.

The Self-Lubricating VIBRAPAC cuts downtime...helps you produce more concrete block at less cost.

Throw away your grease gun! A Besser VIBRAPAC now lubricates itself . . . at regular intervals . . . *while it is running.*

No more downtime for lubrication! No lost man hours. No premature wear of insufficiently lubricated parts. And, no *over* lubrication. Instead, you get constant operation, smoother operation, vastly longer service from moving parts . . . with each bearing getting the right amount of lubricant at the right time, *automatically!* All this adds up to increased output at lower cost. And that's what you need to get a bigger share of today's heavy demand for quality block.

Of course, a VIBRAPAC has many other features that only BESSER can give you . . . more power . . . more production . . . smoother, high-speed operation . . . pin-point precision that assures finer block with greater output . . . rugged construction that provides many years of satisfactory operation.

Write for Vibrapac literature.

BESSER COMPANY

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UNUSED Army Trucks

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INTERNATIONAL and GMC **6x6's**

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- *Factory-New Condition!*
- *Delivered on Approval!*
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Tandem axle trucks with front wheel drive, 10 forward speeds, overdrive, brand-new mud and snow tires. Carry maximum loads, give extra power you need in "rough going" . . . at LESS, often half the COST of conventional new trucks.

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Attractive living room in which painted block partition walls contrast with plastered exterior wall. Steel reinforcing rods of walls are hidden. The floor and roof are 6-in. thick reinforced concrete slabs

Blast-Resistant Concrete Masonry House

AN ATTRACTIVE, moderately priced, blast-resistant reinforced concrete masonry house has been designed for the Portland Cement Association. It is a product of several years of research, and incorporates principles of blast resistance learned from actual experience at Hiroshima and Nagasaki, and from tests at Yucca Flat* and Eniwetok Atoll.

Designers Amman F. Whitney, consulting engineers of New York and Milwaukee, and Ellery Husted, architect of New York, estimate that the house can be built for less than 10 percent more than a house of similar design without its many protective features and other superior qualities. They estimate that if a hydrogen bomb 1000 times more powerful than the Hiroshima bomb was exploded over

*See ROCK PRODUCTS, July, 1955, p. 142, "Concrete Houses Survive Atomic Blast," for detailed account of Civil Defense "Survival City" nuclear tests at Yucca Flat, Nev., on May 5.

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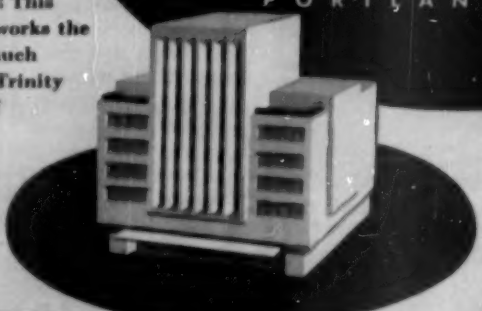
Trinity White

PORTLAND CEMENT



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A product of GENERAL PORTLAND CEMENT CO.

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As white as snow

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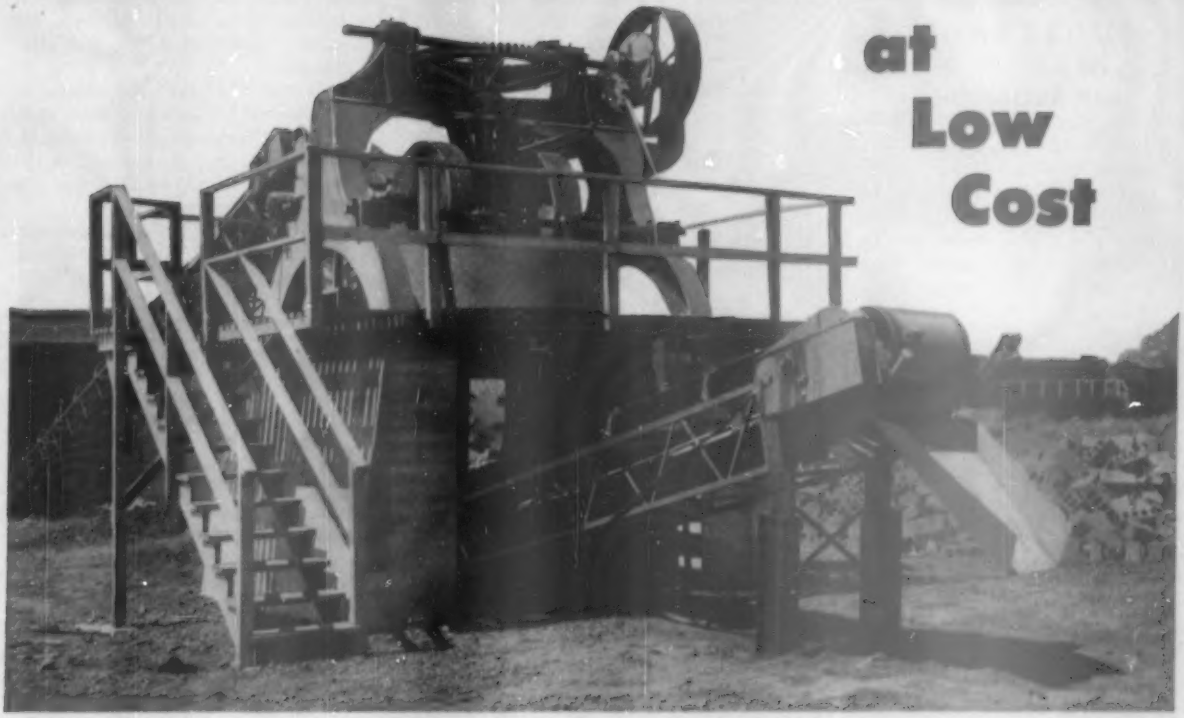

Ideal For Aggregate Grinding

- Delivers up to 30 yards per hour.
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- Adjustable to meet volume and size requirements.
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Huber-Warco Grinders range in capacity from 4 to 75 yards per hour. Whatever your capacity requirement, there's a Huber-Warco Grinder exactly suited to your type of aggregate. Ask for a non-obligating consultation with the Huber-Warco grinding specialist . . . write, wire or phone.

HUBER-WARCO NO. 9 GRINDER

This 30 yard per hour capacity grinder has been designed to give big-volume aggregate production with a minimum of grinding costs. The suspended yoke mounted mullers are adjustable to any height, and for finer grinding, the grinding surfaces run together.

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COMMENT
from the
BUTLER ENGINEER
. . . Of a Giant, Whiskers and Successful Bids

Your Butler engineer has now dealt with the ultimate — the pinnacle — the Mt. Everest of complexity in materials handling and plant design. Did I say "plant"? I meant multiple plants. It's a gigantic layout. On my preliminary scale drawings a line of 10 freight cars looked small as 10 whisker bristles from a morning shave. It's a huge ready mixed concrete deal; they sell sand, gravel and other aggregates, and they also have a large asphalt operation. Materials come in and ship out by train, by barge and by truck. And conveyors had to be designed to switch from barge to truck and again to train from the enormous stock piles. In several instances conveyors had to be reversible on exactly the same plane.

The entire yard is a network of rail lines and sidings, yet we were able to plan all truck routes without crossing any tracks . . . Have you ever seen a complicated wiring diagram? That's about what our drawings resembled.

But we're all proud to have been consulted and we're doubly proud our plans and recommendations are accepted. We feel that it is not only a feather in our cap; we think it represents more feathers than are in an Indian war bonnet.

•

Roadbuilders have a cheerful fact to deal with since the development of the Butler *Automatic* Roadbuilders Plant. As you may know, it batches sand, cement and two sizes of stone *with only one operator.* (Suggest you write for Bulletin describing it) . . . The cheerful fact? A contractor with this plant can successfully bid any paving job he wants, and make a bigger profit.

That's a *concrete* fact.

Yours faithfully,

The Butler Engineer

BUTLER BIN COMPANY
WAUKESHA, WISCONSIN

the center of a large city, this additional investment by new home builders would probably save 70 to 80 percent of houses located on the periphery of the city, houses that otherwise would be destroyed.

Unlike the concrete houses recently tested at Yucca Flat,* this house is specifically designed to afford protection for both life and property against nuclear attack. It is claimed to be able to withstand pressures more than 2½ times those which collapsed houses in Japan.

Blast-Resistant Features of Masonry House

The blast-resistant features incorporated in the house are not limited to the particular architectural design selected, but can be used to increase the resistance of virtually any new concrete house to enemy attack and to the natural hazards of earthquakes, fire, tornadoes and hurricanes.

These principles, verified by actual experience and/or full-scale tests include:

1. Use of fire-resistant concrete masonry and reinforced concrete throughout.

2. Construction with thicker than usual exterior walls, to provide greater protection from blast and initial radiation.

3. A special method of reinforcing all walls and partitions to greatly increase their resistance to blast pressure. In Nagasaki, 9-in. thick *unreinforced* masonry walls were cracked as far as 8000 ft. from the blast.

4. Heavily reinforced concrete roof and first floor slabs.

5. A shelter that is an integral part of the basement, constructed to provide protection against blast (capable of withstanding pressures of 1900 p.s.i.), thermal flash and radiation.

6. Ready exit from the shelter to the outside by means of reinforced concrete stairs and basement windows. Tests at Yucca Flat have shown that unless these precautions are taken, "survivors" in basement shelters may be trapped by debris and fire.

7. Provision of emergency living accommodations in the basement. This area is divided into separate rooms, including one for storage of provisions, a shop for repairs, a living and recreation room, and a fireplace for emergency cooking if gas and electricity fail.

8. Large windows and doors to permit partial balancing of blast pressures. These openings allow some pressure to enter, thereby minimizing the pressures for which walls, floors and roof must be designed.

9. Strategic location of interior partitions, to reduce long unsupported roof spans and to brace exterior walls. This has been done without sacrifice of room space and livability.

Both the basement and above-ground walls of the house are of 12-in. rather than conventional 8-in. concrete block, the extra thickness adding greatly to resistance at a nominal increase in cost. In addition, vertical steel bars or "tie-rods" are spaced at close intervals just inside the exterior walls. These rods are threaded into inserts in the floor slab, then tightened and anchored by means of plate washers and nuts recessed in the roof slab. The rods are hidden behind fire-resistant furring and plaster, so that the interior side of the exterior walls appear as normal plastered walls. The rods hold the roof and floor slabs securely against the top and bottom of the walls, thus serving to slightly compress the block

(Continued on page 216)

Cross-section of the basement shelter, stairway to outside doorway, and 12-in. exterior wall. Ceiling of shelter is reinforced concrete stairs and stair landing. Note steel tie-rod located in space between exterior wall and interior plaster

"We tested three mixers...

then bought Worthington HI-UP ..."

Now *there's* a thumping endorsement of Worthington Hi-Up Truck Mixers. It comes straight from the J. B. McCrady Company of Verona, Pa.

McCrady put a Worthington Hi-Up and two other mixers right to work on the job. McCrady watched their performance, checked the quality of distributor service, too. Let President John B. McCrady tell you the outcome himself:

"We do not believe there is a better mixer manufactured. Excellent service along with splendid field help by Worthington was responsible for our purchase of 3 more Worthington Hi-Up Mixers."

What convinced McCrady? Features that helped deliver *better* concrete *faster* — engineered weight distribution for maximum legal payload . . . speedy discharge, even with low-slump concrete . . . and a really *rugged* transmission. Speaking of the transmission, it's *specifically designed* for a truck mixer. Single-lever operation, too.

Call your distributor now

Make arrangements today to see Worthington MIXERAMA — either working from your batching plant or from a Ready-Mix plant in your area. You'll be glad you did — almost as glad as you'll be when you can call one of these hard-working truck mixers your own. Worthington Corporation, Concrete Machinery Division, Section R.5.2, Plainfield, N.J.

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If it's a Concrete Job, It's a HI-UP Job

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These are the facts. And they all add up to the sound proof that MARCO offers you perhaps the finest, most complete line of ball bearing idlers available to American industry today.

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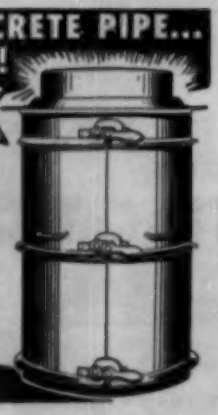

Quinn WIRE & IRON WORKS

KEEP ABREAST WITH INDUSTRY TRENDS THROUGH ROCK PRODUCTS

and prevent inward buckling under heavy blast pressures.

The house is attractive both inside and out. Exterior walls are of exposed concrete masonry, painted with portland cement paint. Partitioned walls are also of exposed painted concrete masonry, and contrast pleasantly with smooth plastered interior surfaces of exterior walls.

Designers of the house are quick to point out that no house yet developed can by any means be considered a final answer to nuclear attack. But they believe that this house represents a real step forward in that it offers at moderate cost a truly substantial degree of protection not only against enemy attack but also many natural hazards.

The additional cost of the blast-resistant house would be wholly or in part offset by its longer life, lower maintenance cost and lower insurance rates resulting from the sturdy, firesafe concrete construction.

PRECAST FLOOR SLAB

(Continued from page 193)

easily placed on previously set precast piers, each capable of supporting several tons per square foot, a much heavier load than they will carry in the average home. Each of the slabs is cemented into place with rubberized cement, which eliminates expansion problems.

One of the first uses made of these slabs was in a new home Mr. Cornelius built for himself on the St. Johns River a few miles south of Jacksonville. In this installation, a thick layer of Zonolite insulation was placed under the floor. The top surface was sealed with a moisture-proof plastic sheeting. Under the floor is an air space of 1½-in. through which heated or cooled air is forced by a blower to escape upward through registers into the living portion of the house. Thus a floor-type heater, such as is being installed in many homes that do not have basements, will heat or cool the floor as well as the upper air.

In the Cornelius home, a different color flooring was provided for each room, with multi-colored slabs being used for the porch floor.

Workmen's Compensation Insurance

NATIONAL CONCRETE MASONRY ASSOCIATION has published Bulletin No. 3, discussing how concrete block producers can reduce the cost of workmen's compensation insurance by establishing and maintaining a safety program. Factors determining the amount of premium and the effect which safety has upon them are also briefly explained.

STRONGER concrete blocks

Block made with D-40. Note the fine texture, color and appearance—the sharp edges and corners.

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KEEP ABREAST WITH INDUSTRY TRENDS THROUGH ROCK PRODUCTS

TRUCK MAINTENANCE

(Continued from page 216)

facturer. A new local distributor had just been appointed. He had no stock. One truck had been down ten operating days. We couldn't locate required parts within a radius of several hundred miles. We knew that a competitor had similar tandems. We learned that he had been experiencing identical transmission difficulties; that the downtime difficulty had been partially solved by putting on a special drive shaft. By picking easy jobs for these trucks he had been able to operate the equipment with one axle driving while the regular transmissions were being repaired. You can learn from other truck operators—most certainly from competitors—and others in the ready-mixed concrete industry. The trouble in this case was that we didn't learn from our competitor early enough. Had we done so, we could have avoided the purchase of unsatisfactory equipment. A check of performance records showed that we had on our hands a couple of "downtime" champions.

Lubrication Problem

In beginning our program we found that every time we had a lubrication job all truck wheels had to be packed. The wheel packing job, normally scheduled for twice a year or every 10,000 miles, had been almost completely neglected. Trucks scheduled for lubrication had to be re-scheduled for wheel packing. Downtime, already a pressing problem, became a most serious matter. Conditions were so bad that wheel packing had to be done before each and every truck was returned to service. When several trucks are already down, it's a tough decision to withhold another unit from service.

Briefly, this was our problem:—we had 20 mixer trucks of our own to lubricate and service every two weeks. Our head mechanic figured that, because of the condition of the equipment, each job would take two men 4 hr. Adding up, two men working on 20 units, would require 160 hr., their approximate total straight time for a month. As previous experience indicated that men spent one-half their time on other work, we would be in trouble whenever emergencies came along. As a way out of this mess, we decided that whenever a truck was down for repairs, we would do both a complete lubrication and a wheel service job.

This worked out fine on trucks serviced by the day shift. We ran into trouble with the night crew, as many wheels were in such bad shape that new bearings and cylinders were re-

quired, which we didn't always have in stock. If suppliers weren't open, we had to complete the work in the morning after parts were available.

With the wheels off, this was the time to check on the brake linings. Again we ran into trouble on parts and in some cases a truck was necessarily down all the next day. We came to the decision that whenever we had a truck down for repairs, we would attempt to service that unit completely, even if our working schedule did not call for such services at that time.

The problem of wheel packing alone considerably retarded our preventive maintenance schedule and for a while threatened our whole program. To bring order out of chaos, we had to consider and put into practice shift changes, additional overtime working hours and working around the clock, as well as job out a great deal of work that we had planned to handle in our own shop.

After all the wheel servicing had been completed and the rest of the work load had leveled off, we began to put first things first, and again worked toward our prime objective—to hold downtime to a minimum. When a truck breaks down, our first concern is to determine the minimum repairs that have to be made in order to get that unit back into operating condition at the earliest possible moment. To do this, we defer other required repairs and servicing until the night shift or even until the weekend if the truck can be operated safely and without incurring further damage.

Off the highway job use of mixer trucks requires that our delivery equipment be lubricated and serviced more frequently than trucks operated by most other industries. If a producer's trucks are showing an annual mileage of 15,000 miles, his delivery equipment should be given attention corresponding to trucks that operate 25,000 miles or more. In this manner, a producer takes into consideration operating hours, unloading time, excessive idling, dusty plant conditions, and tough job hauling.

Mixer truck engines, especially the back cylinders, take a real beating during dusty, dry, summer operation. Short hauls, tough ground pulling, and considerable idling add to the strain put on the trucks' motors. Under these operating conditions, mixer truck engines need the best possible valves in addition to most carful lubricating attention. A number of producers believe that sodium aircraft type valves are the best answer to our industry's rugged requirements. Mixer truck operation during the summer months may require an oil and filter change every three weeks; during the balance of the

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Chicago 3, Ill.

year, an oil change every five weeks and a filter change every ten weeks should suffice.

On lubrication and tire care, certain points should again be stressed. Carefully plan lubricating routines. See to it that all trucks get regular, systematic attention. In engines, use high detergent compounded oils. Properly service and replace oil filters. Buy the right kind of tires for mixer trucks. Insist that drivers make a daily check for loose studs. See to it that proper tire pressures are being carefully maintained. Take effective steps to prevent uneven tire wear. Regularly examine trucks for mechanical defects. Stop mis-matching of tires. Recap on time.

On truck appearance, interior condition of drums, lubrication and tire care, aggressively seek drivers' cooperation.

A producer's truck, in its second year of operation, requires more attention than a new unit. A truck in its third year will require still additional service. Given proper care throughout its operating life, a truck needs more servicing as hours of operation pile up. In planning preventive maintenance schedules for a mixer truck fleet, consideration should be given to the operating age of each individual unit.

"What's going to be done" will be approximately the same for all trucks in a fleet. "How frequently things are going to be done" should be based on age and condition of individual trucking units; e.g., a truck in its fourth year of operation will generally require two or three times the maintenance hours required to keep a year old truck in first class condition.

The relatively few hours of maintenance that a new truck requires involves principally lubrication (at regular intervals), checking, inspecting, tightening, and adjusting. As a truck gets older, lubrication demands necessarily become more frequent; additional parts must be checked and adjusted; adjusting becomes a more difficult problem (as parts begin to wear); there is more taking apart and replacing; overhauling enters the picture; the truck is in the garage for longer periods of time and the unit is not as dependable in service.

During the first operating year of a truck, approximately 60 labor hours of preventive maintenance should suffice to keep it in good operating condition. During its second year, about 100 maintenance hours should do the trick. In its third year of operation 120 to 150 labor hours would be an average expectancy, with 175 to 200 hr. required during the fourth operating year. If you are enjoying comparative freedom from downtime with

and now... the

NEW-Challenge "Pacemaker" TRUCK MIXER

4½-5 YARD

With the addition of the 4½ yard Pacemaker, Challenge now offers the industry a mixer for every possible ready mixed concrete requirement — the only complete line on the market!

Now 9 Standard Size Challenge* "Pacemaker" Truck Mixers

3 — 3½ Yard	4⅓ — 5 Yard	6 — 6½ Yard
3⅓ — 4 Yard	5 — 5½ Yard	6½ — 7 Yard
4 — 4½ Yard	5½ — 6 Yard	8 — 8½ Yard

Also Side Engine, Power-Take-Off, and Engine-Take-Off Models

Value Standard of the Industry

Exclusive National Distributors for
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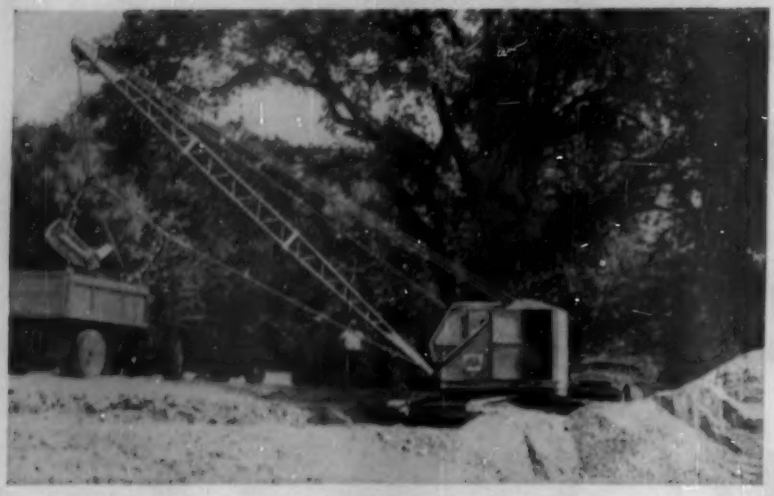
COOK BROS. EQUIPMENT CO.
3334 San Fernando Road, Los Angeles 65
Telephone: CLeveland 6-3151

How 1 BANTAM earned $18,000 in only 10 months!



handled sand and gravel and other excavating jobs

Busy BANTAM owner Weldon Laurence of Weldon Laurence & Sons, Prophetstown, Illinois, is talking from experience about a BANTAM's bigger payoff. He formerly owned a larger dragline, too cumbersome, too costly to operate and maintain for his work—excavating gravel from a river bed into stockpile and truck loading it . . . as well as other digging jobs, Laurence switched to the low-cost BANTAM method.

In his own words, businessman Laurence says: "I find the BANTAM ideal for gravel and basement and ditching work. It has the ability to move easily. I like its ease of operation. We'll average $18,000 a year income from our BANTAM, working only 10 months."

That's not all. This BANTAM booster also reports: "My BANTAM has worked harder and more in the past 2 years than other rigs in this area do in 5 years." Laurence now has his second BANTAM!

You can cut your costs, too, with a BANTAM! Mail the coupon.

New BANTAM Crawler Tumbler and Shoe Design Cuts Track Maintenance Costs!

New drive tumbler has mounted pins which provide a *rolling* contact between hardened rollers and pins and track lugs—virtually eliminating wear and damage caused by excessive abrasion. With BANTAM design, driving lugs of shoes have an involute or curved surface for correct engaging action during travel. Fast on-the-job replacement eliminates costly down time and work delays.

World's Largest Producers of Truck Cranes and Excavators

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Schield Bantam Co. CP 22
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Rush me full details on _____ Crawler BANTAM, _____ Truck-Mounted _____ Self-Propelled.

Name _____
Position _____
Company _____
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City _____ State _____

annual labor hours averaging lower than these figures, you are all right.

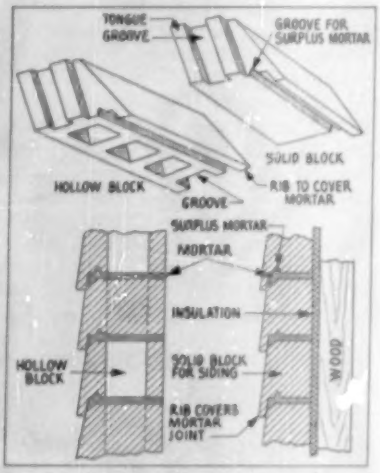
LAP SIDING BLOCK

A NEW TYPE OF LAP SIDING BUILDING BLOCK has been designed by Carl K. Schels of the Forest Products and Lumber Co. of Eagle River, Wis. The idea for this patented block developed from a desire to give the appearance of wood lap siding to home and garage construction and public buildings but to retain the advantages of concrete block material.

The thickness of the lap is 1⅛ in. with the lap resting 1 in. down over each block. An interlocking design eliminates all mortar joints on the face of the wall. The shadow line effect and the application of waterproof cement coating of any color desired makes an attractive looking appearance. Also a specially designed cedar or redwood-paneling will be offered for trimming the gabel ends, which will give a two-tone appearance.

The block is of standard size and will probably be produced primarily of lightweight material. It is believed to be adaptable to most block-making machines now on the market with the addition of special molds and pallets.

As the handling and transportation of the block may result in some breakage, it is planned to provide a cap to cover the lap or laps on each load in transport which are likely to have breakage.



Details of patented concrete block designed to give the appearance of siding

It is expected that the use of this building block will open up new markets for the use of concrete block by supplying an item that meets the public demand for appearance and quality in construction.

●

CONSUMERS CO. has opened a ready-mixed concrete plant and sales yard in Riverdale, Ill.

PORTLAND
PENN-DIXIE
CEMENT

CONCRETE FOR DEPENDABILITY

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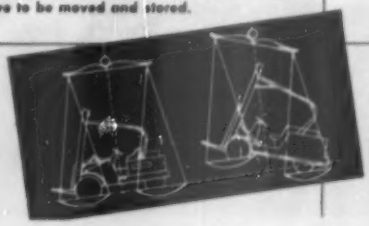
Your Plant Needs

the COUNTER-ACTIVE WEIGHT DISTRIBUTION of GERLINGER LIFT TRUCKS!

In the concrete field especially — where continual changes in load widths and weights are a common transportation problem — Gerlinger Lift Trucks have consistently outperformed other material handlers. Most important reason for this leadership is the nearly even weight distribution of the Gerlinger.

When unloaded, 54% of the lift truck weight remains over the front wheels of the Gerlinger. This unusual balanced weight distribution — an exclusive Gerlinger feature — allows the driving wheels to obtain top traction and braking power under changing load weights and sizes.

It's just one of many job-proven features that make Gerlinger Lift Trucks first choice in concrete products plants where off-size loads have to be moved and stored.

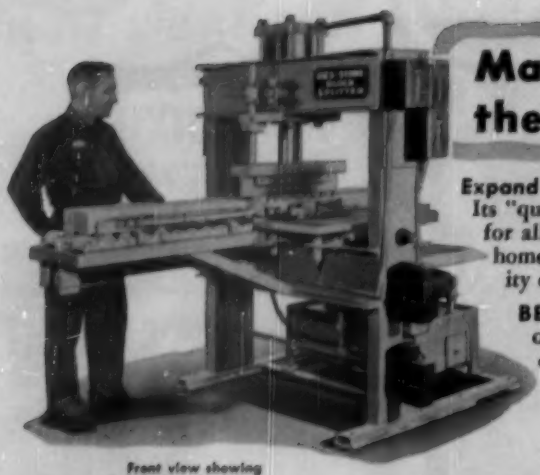


● **Gerlinger's exclusive Counter-Active Weight Distribution is graphically shown here in comparison with the excessive counter weight of other lift trucks. This nearly even weight distribution assures ample braking power at all times, longer tire life, less frame strain and the maximum steering and operating ease**

GERLINGER CARRIER CO.

G-207

GERLINGER CARRIER CO., DALLAS, OREGON



Front view showing operator feeding block into BES-STONE Block Splitter.

Make this your BEST year with the BES-STONE Block Splitter

Expand Your Opportunities — Cash in on the Split Block demand. Its "quarried stone" character pleases owners. You'll find it ideal for all structures, large or small . . . commercial, institutional or home construction. BES-STONE challenges the creative ability of both architects and builders.

BES-STONE Splitters — Automatic, powerful, hydraulic operation . . . up to 960 Split Block per hour. Straight line cuts . . . No cull block. Easily adjustable for splitting various block heights. Block is placed under knife, automatically. And the finished Split Block is automatically removed from under the splitting knife by the incoming block. Quiet, safe operation.

PONY BLOCK TRIMMER

Indispensable tool for on the job. Trims off the end of any block up to 8" by hand operated, hydraulic pump. Capacity 12 tons. Legs easily removable. Compact. Lightweight. Easily portable.

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Profitable Producer of 960 Split Block per Hour!

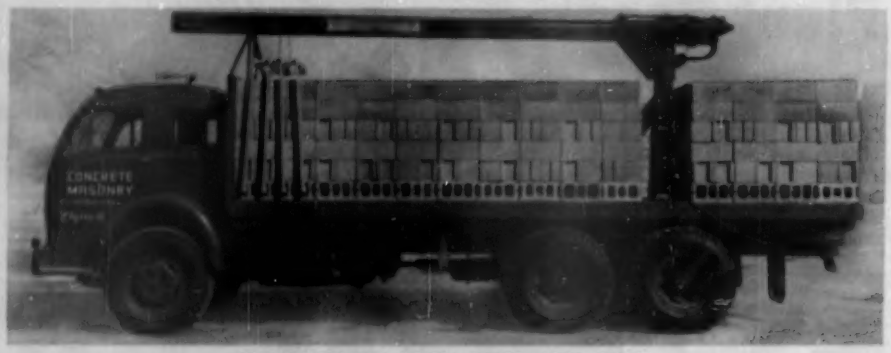
There's big money for you in attractive, permanently colorful BES-STONE Split Block. It complements and increases sales of standard stripper block. Get all the facts. Write for BES-STONE Bulletins 95A and 100.

Note the natural beauty of BES-STONE. No maintenance, no painting, no pooling off.

BES-STONE *the Split Block with Character*

BESSER COMPANY • Complete Equipment for Concrete Block Plants • Alpena, Michigan, U. S. A.

SIDE-O-MATIC



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first
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and now
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truck-men DO MORE FOR LESS . . . Says F. F. KIRCHNER

Model 40 loading a cube of blocks on truck

Model DHP with empty rack in front of kiln

"We have one two-ton Truck-Man Model 40 High Lift and two 4,500 lb. Truck-Man Model DHP's," says Mr. Kirchner, of F. F. Kirchner Material Company, St. Louis, Missouri. "What a combination! One DHP shifts loaded racks from the block machine to the kilns, from the kilns to the cubing area and then takes the empties back to the machine. The 40 takes the cubes to the yard, loads cubes from the yard on highway trucks and even unloads bagged cement and other materials that we receive. The other DHP is used for odd jobs and as an auxiliary in shifting racks when we are rushed.

"We've really got the handling problem licked now," he continues, "That DHP is the most efficient little work horse I've seen and it's so darned economical. Moving loaded racks eight hours a day on two gallons of gas —it's almost unbelievable.

"As for the Model 40, it's easy to see that it was designed from the ground up for block plant use.—Rugged, maneuverable, plenty of power, easily maintained and those big tires can go any place.

"Like everyone else, we're watching costs these days. So we were pleasantly surprised to find we could buy all three of these trucks for a lot less than the cost of two ordinary fork trucks. Our experience has proved to us that they are more efficient and versatile, too."

For information on how Truck-Men can cut costs in your operation, complete and mail this coupon today.

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Bristow Plant $20,000.00

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STROUD, OKLAHOMA

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Located in City of 7,000 in central Michigan.
Established ten years.
No competition within 20 miles.
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2-year old Columbia 2-block Machine with 4", 8", 12" attachments, many specials.
Racks for 2160 blocks per day.
New steam boiler for curing, 7 trucks, front-end bucket loader, new fork lift.
Aggregate no problem.
Has grown from a gross of $15,000 to $80,000. Net profit last year over $16,000.
Reason for selling, other interests.

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COLOR YOUR CONCRETE WITH LANSCO CEMENT COLORS, available in 40 ATTRACTIVE shades. Suitable for all types of concrete products. Write for our new color card, copy of "Suggestions For Using Cement Colors", and for free samples and price list.

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Standard, High Early, and White conforming with A.S.T.M. spec. available in carload and shipload quantities. Our monthly tonnage allocation is offered subject to prior sale and final commitment from mill. For samples, spec., prices contact Schoepp & Lyons, 6623 W. Commerce St., Tel. General 22661, San Antonio, Texas. U.S. Sales representative, Tolteca Portland Cement Co., S.A., Mexico City. Largest and most modern plant in the Republic, in operation over 45 yrs., subsidiary of Associated Portland Cement Manufacturers, LTD., London, England.

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Write for samples and brochure, "Getting Results With Color in Concrete and Cement Products"
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Stearns 42 c.f. batch mixer new main bearings and pinion bearings, new shell liners.

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CEMENT COLORS
MORTAR COLORS
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If you plan to discontinue business or retire and want to sell, or lease, your entire block producing equipment, write me today. I have a fifteen year supply of cinders and want to set up complete equipment by January 1956.

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One 55 ft. portable 18" conveyor with 7½ H.P. motor.
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2800 plain steel pallets ¼ x 12½ x 17.
One 25 cubic foot Besser mixer & skip hoist.
One 50 ton two compartment bin with volume batchers.
One 75 H.P. motor with all switches & controls.
One Lewis-Sheppard lift truck battery operated, 3 ton capacity.
The above equipment is forced off of property by cancellation of lease, and can be bought at sacrifice prices.

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If Bill wasn't being promoted to a sales position we wouldn't be running this ad.

Bill is a mechanical whiz. He knows block machines backwards and forwards.

Before he came to us as a serviceman Bill spent about 4 years working in a Block Plant.

He worked his way up from a fork truck operator to machine operator and later to the position of maintenance and general repair man.

What Bill doesn't know about the art of blockmaking is nobody's business. When he gets a wrench in his hand it isn't long before he has everything dancing to his tune.

The company furnished Bill with a brand new station wagon and with it he has travelled all over the southeastern part of the country.

There is hardly a city, town or village south of the Ohio and east of the Mississippi River that Bill hasn't at some time or other been in or near. All on a very liberal expense account.

Bill has set a pretty good pace for anyone who steps into his shoes. If you'd like taking a whirl at Bill's Job and think you'd like sometime to work into a sales position, write giving age, past experience, and one good reason why you'd like to fill Bill's shoes. Oh yes, a photo of yourself if available.

LITH-I-BAR-CO. Holland, Mich.

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(SAVE TIME & MONEY)

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Your contractor and bricklayer customers will be able to do quicker, easier, straighter work with UB Tools . . . tools that carry YOUR OWN COMPANY ADVERTISING. Linestretchers, Corner Ties, Line Pins, Twigs, Concrete Calculators. We also wholesale a complete line of Blocklayers' Tools. Write for literature and prices.

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1 under-car unloader with Wisconsin Eng.
1 26 ft. Belt Conveyor (cleated) with Wisconsin Engine. Good Cond. Ideal for unloading cinders or aggregate. Both units for $1,000.00.

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Appley-Yellen 2-block Semi-Auto. Block Machine
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A complete Plant ready for operation. Capacity 600 blocks per hour. Has made only about 500,000 blocks. Located in Northeast.
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Salesman calling on concrete products trade. Aggressive company with specialty products. Give complete resume of experience and background. Write

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79 W. Monroe St. Chicago 3, Ill.

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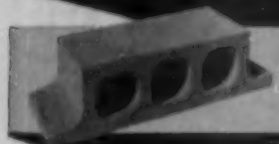
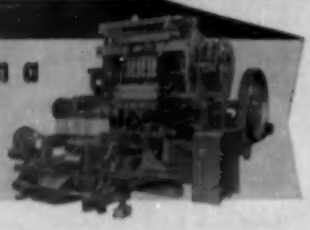
Advertise your used equipment in ROCK PRODUCTS

VIBRAPAC Block
for Loadbearing Walls



SOFFIT Block
for Floors and Roofs

Make 'em ALL on a
BESSER
VIBRAPAC



You'll find Vibrapacs are versatile. They not only make conventional block in all types and sizes, and brick 32 at a time . . . they also make Soffit Filler Block for floors and roofs. And the same set of Plain Pallets takes care of ALL units. Write for literature.

BESSER COMPANY
ALPENA, MICHIGAN, U. S. A.
Complete Equipment for Concrete Block Plants

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Improve moisture control, speed loading, save space with Neptune Auto-Stop water meters. Set by pushing buttons; meter cuts off automatically. Excellent reputation for sustained accuracy and trouble-free operation. ***Ask for Bulletin 562 WRP***

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FOR READY-MIX PLANTS AND BLOCK PLANTS

NEPTUNE METER CO., 19 W. 50th St., New York 20
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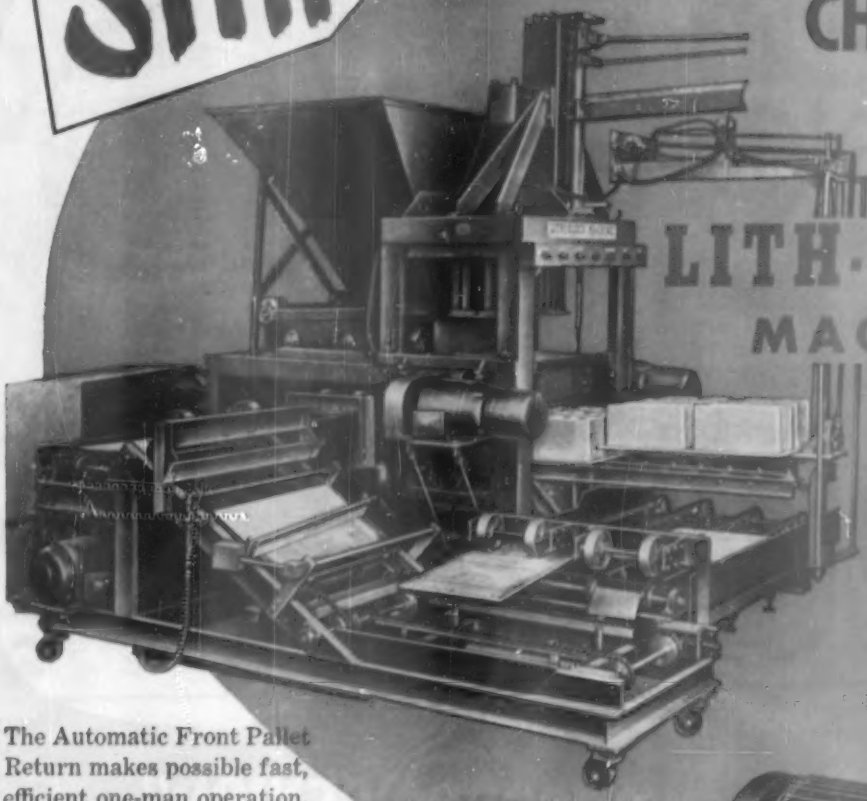
Still the QUALITY PRODUCTION CHAMPION



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- NEW CENTRAL CABINET FOR MAJOR CONTROLS
- NEW DUAL-ECCENTRIC AGITATOR DRIVE
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- QUICK-CHANGE MOLD BOX
- STANDARD SIZE PLAIN STEEL PALLETS

The Automatic Front Pallet Return makes possible fast, efficient one-man operation. It may be used with any size Lith-I-Block Machine, old or new, and is available for either right or left hand feed. Lith-I-Block Machines are made in five standard models. There's a size to fit the needs of any producer, large or small.

BONUS QUALITY

LITH-I-BLOCK

MADE ONLY ON THE LITH-I-BLOCK MACHINE

LITH-I-MIXER

Advanced design features and rugged construction make this the ideal mixer for block plant operation. Tough, long-wearing, Ni-Hard liners and blades are used in both 30 and 50 cubic foot models.

SEND TODAY for detailed bulletins (Nos. C-102, C-103) on Lith-I-Block Machine and Lith-I-Mixer — a post card will do it.

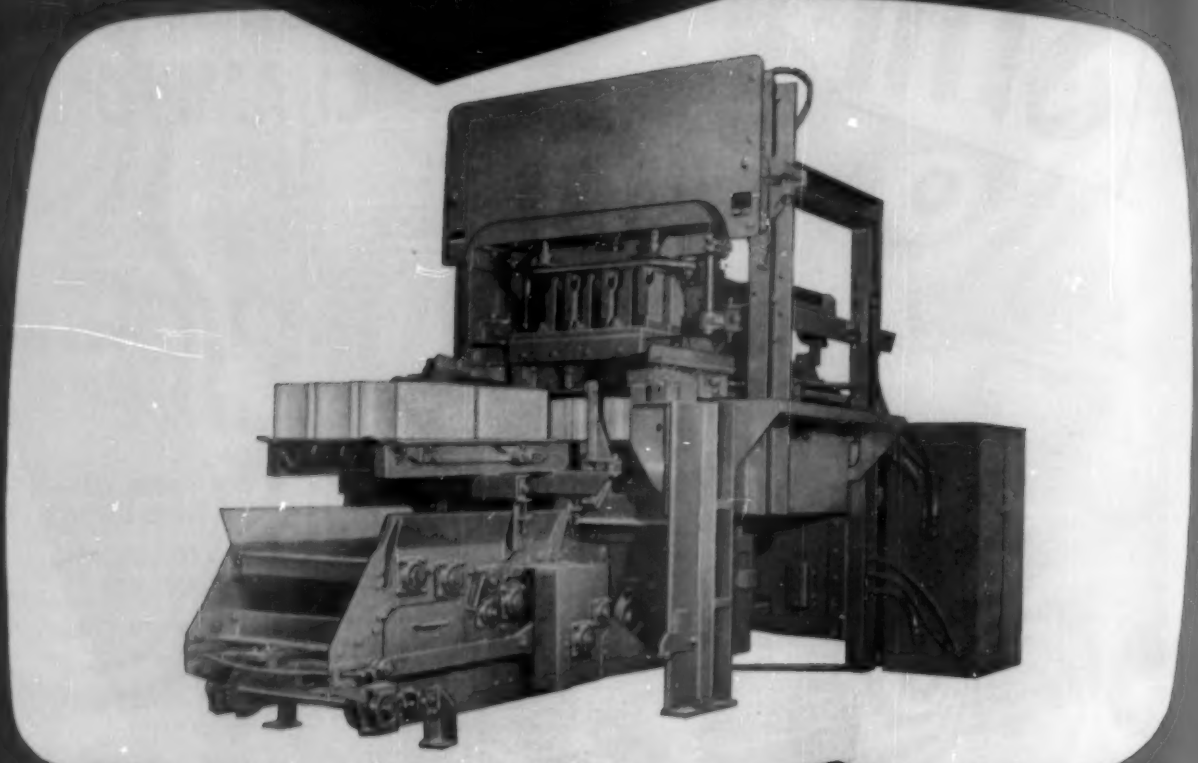
ONE PIECE OF EQUIPMENT OR A COMPLETE PLANT LAYOUT

LITH-I-BAR CO.

HOLLAND, MICHIGAN

SALES AND SERVICE THE WORLD OVER

YOU GET LOWEST UNIT COST



WITH A GOCORP "SENIOR"

HERE'S WHY

- **YOU USE LESS CEMENT** — Users tells us that GOCORP Plain Pallet machines use up to 10% less cement than competitive makes because they pack better.
- **YOU HAVE LESS DOWNTIME** — The smooth, unhurried hydraulic drive means trouble-free performance — slashes maintenance costs. A typical owner reports that his maintenance averaged less than two tenths of a cent per unit over a four-year period, including mold boxes.
- **YOU GET FEWER CULLS** — As low as one tenth of one percent of production they tell us. Green blocks have uniform density, stand up better during handling.
- **YOU GET GREATER PRODUCTION** — Sequence operation means easier, quicker adjustments. Higher production of quality block.
- **ADVANCED DESIGN**—Assures years of high production without fear of obsolescence.

MAKE US PROVE IT —
No foolin', write today and ask us for names, facts and figures to back up these statements.

AUTOMATION MEANS RACKMAN—for leaps in performance, it's the "Senior" plus RACK-MAN (GOCORP's revolutionary automatic rack loading device).

GOCORP
ADRIAN-MICH.

Here's a typical service record of BLAW-KNOX CLAMSHELL BUCKETS

This 3-cu. yd. lever arm bucket is still in service after 14 years on the job . . . a typical work record for Blaw-Knox Clamshell Buckets.

Over 50 years experience has taught Blaw-Knox engineers the fine points of bucket manufacture . . . where to build in the extra strength to withstand the abuse of severe conditions . . . how to design buckets to meet the exacting needs of an exacting industry . . . how to analyze *your* job requirements to help you select the specific size, weight and type of bucket you need.

There are Blaw-Knox Buckets designed for excavating, dredging and the rehandling of over 480 listed materials! Ask your Blaw-Knox distributor to help you select the right bucket for your job.

BLAW-KNOX

BLAW-KNOX COMPANY
BLAW-KNOX EQUIPMENT DIVISION
Pittsburgh 38, Pa.
Offices in Principal Cities

ASK ABOUT THE BLAW-KNOX "Complete Package" OF CONCRETE PAVING AND READY-MIX EQUIPMENT

Highway and Airport Paving Forms • Precision Subgraders • Aggregate and Bulk Cement Batching Plants • Concrete Spreaders and Finishers • Concrete Pavers • Road Wideners • Base Pavers • Bituminous Pavers and Finishers • Tandem and Trench Rollers • Truck Mixers • Truck Mixer Loading Plants • Concrete Buckets • Curb, Gutter and Sidewalk Forms.

Increased* CEMENT PRODUCTION

BRADLEY HERCULES MILLS

The quickest, most economical way to increase your grinding capacity

For the cement manufacturer with excess kiln capacity . . . here is the answer to INCREASED CAPACITIES *at an appreciable* SAVING IN HORSEPOWER. *The Bradley Hercules Mill, used as a preliminary pulverizer before compartment mills or tube mills, results in* INCREASED PRODUCTION *of finished material at a* LOWER COST *per barrel.*

Rugged, dustless construction, maximum accessibility keep maintenance costs at an absolute minimum.

Automatic electrical feed control eliminates manual operation.

For complete information, write for Catalog No. 57

Bradley PULVERIZER CO.

LONDON ALLENTOWN, PENNA. BOSTON

Increase Storage Capacity Up to 10 TIMES

Notice how the addition of a Swivel-Piler will increase the storage volume of a conveyor, without moving the conveyor.

S-A **SWIVEL-PILER**
for conveyor mounting

The S-A Swivel-Piler, quickly and easily mounted on the end of your conveyor, will increase your storage range 10 times and eliminate frequent conveyor moves . . . saving you hundreds of dollars. This simple, centrifugal thrower unit throws almost any bulk material, up to 2" lump size. User always has complete control over the path of discharge.

IN STOCK FOR IMMEDIATE DELIVERY

Write today for complete information.

STANDARD PRODUCTS DIVISION
STEPHENS-ADAMSON MFG. CO.
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CAST IN CALUMETAL X5 ALLOY

REDUCE DOWNTIME... STOP PRODUCTION LOSSES

Let us cast your Cooler Liners, Nose Ring Segments, Kiln Pipe and other parts subjected to intense heat in CaluMetal X5, and you can be sure of longer part life and uninterrupted operation. This superior heat-resisting alloy withstands temperatures to 2000°F and casts into accurate, high quality pieces.

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CALUMET STEEL CASTINGS CORP.
1638 SUMMER STREET • HAMMOND, INDIANA

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DREDGING PUMPS

performance-proven on the toughest jobs

H&B ESTABLISHED 1887

Hetherington & Berner sand and gravel pumps are available in two general types: *STANDARD*, (4", 6" and 8" sizes) with semi-steel parts, for ordinary working conditions and moderate heads; and *DREADNAUGHT*, (6", 8", 10", 12" and 15" sizes) with manganese steel parts, for heavy duty jobs with stringent head conditions.

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GAYCO BRINGS YOU All These!

- Range 60 to 400 mesh
- Greater Capacity
- 35 to 30% greater production
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- Uniform Products
- Slow speed for slow wear
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If you have an exceptionally hard separating problem, **TRY THE GAYCO.**

Closer separations are possible with the Exclusive Gayco Centrifugal sizing fan. Higher production results from a more complete removal of the fines made by the mill. The efficient Gayco sizing eliminates all undesirable oversize from the product.

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Eliminate costly, time-consuming drilling or blasting with this low-cost production tool. Rugged, durable Frederick Drop Balls provide you with quick, easy crushing power where you want it—when you want it, with little or no maintenance. Frederick's exclusive "pear-shaped" design withstands greater impact and gives straighter "pin-point" drops. Exclusive "E-Z Swing" steel eye is recessed to prevent excessive ball movement and keep hook in place. Nickel alloy is standard on balls 4000 lbs. or over—or, we'll be glad to quote on special alloys if desired.

Balls can be furnished with replaceable pins, if requested. Special release hooks for free dropping are also available.

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	Wide Range of Sizes and Weights:						
Pear shape (lbs.).....	1500	2000	3300	4000	5200	6500	8000
Ball shape (lbs.).....	500	1000	2000	5200			
Spherical shape (lbs.)..... (for magnet use)	470	930	1650	2400	3000	3700	5400

FREDERICK IRON & STEEL, INC.

FREDERICK *Established 1890* MARYLAND

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Elevators

McNP

DESIGNERS and BUILDERS of EQUIPMENT for BASIC INDUSTRIES

McNally Pittsburg builds bucket elevators for severe service. They are designed, fabricated and installed to handle all types of bulk materials. When you need rugged bucket elevators, write to McNally Pittsburg.

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Bucket Elevators	Conveyors
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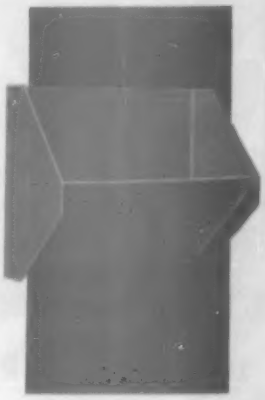
NOT QUITE FOREVER

But Almost

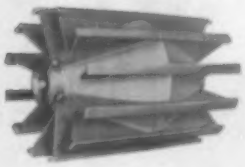
THAT'S THE LIFETIME OF STANDARD ELEVATING AND CONVEYING EQUIPMENT

CONTINUOUS ELEVATOR BUCKET STYLE No. 2



Put this Standard Bucket to work handling the toughest materials, and it takes the job right in stride—resisting abrasion, corrosion and wear. This bucket is typical of the complete line of low cost, rugged Standard Steel Buckets — available in Salem, Style "A," shelf type and other continuous style buckets.

STANDARD WING TYPE SELF-CLEANING PULLEY



The most severe operating conditions won't bother this Standard Pulley because its all-steel welded construction gives it far greater strength and resistance to breaking. And yet it weighs less . . . costs less.

STANDARD BIN GATE

Profit from faster, easier material handling made possible by this gear-operated all-steel Standard Bin Gate. Other styles in Standard Bin Gates also available.

For lower maintenance and material handling costs, convert to Standard. Write today for catalog showing the complete Standard line.

The Standard Metal Mfg. Co. SINCE 1921

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Rotary

DRYERS
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Increase the capacity and efficiency of your plant

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BIN-FLO AERATING UNIT

Provides Steady Flow of Dry, Finely Ground Materials which tend to bridge in storage. Uses only small amount low-pressure air.

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signals change in level; automatically starts and stops filling and emptying equipment.

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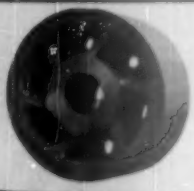
*INTERNATIONAL NICKEL



Constant Haulage *MINE CARS*

Load-Support *MINE CAR WHEELS*

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PLATE FASTENERS FOR CONVEYOR BELTS

Make strong dust-tight, water-tight joints in belts of any width. Special design spreads tension uniformly across belt, allow natural troughing of belt and assures smooth operation over flat, crowned or take-up pulleys. Sizes for belts of from 1/4" to 1 1/2" thickness. Write for Catalog Sheet.

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5386 Northwest Highway, CHICAGO 30, U. S. A.

ROCK PRODUCTS

THE
RECOGNIZED AUTHORITY
OF THE
NON-METALLIC
MINERALS INDUSTRY

In a Hayward, there's no contact between the closing mechanism and the material handled. This means much less wear, reduced upkeep, big savings in bucket maintenance. THE HAYWARD COMPANY, 50 Church St., New York 7, N.Y.

HAYWARD BUCKETS

CLAM SHELL • ELECTRIC • ORANGE PEEL • GRAPPLES

famous for performance since 1888

NOTIFY US OF CHANGE OF ADDRESS TO ASSURE PROMPT DELIVERY OF EACH ISSUE OF

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AUTO VORTEX CLASSIFIERS...

MOST EFFICIENT BY ANY MEASURE FOR SINGLE OR MULTIPLE SPLITS!

COMPARE RESULTS . . . COMPARE COSTS . . . AGAINST ANY OTHER SAND GRADATION EQUIPMENT! AFTER SUCH COMPARISON, YOU, TOO, WILL BUY AUTO-VORTEX CLASSIFIERS . . . WHATEVER YOUR SPECIFICATIONS . . . WHATEVER YOUR PROBLEMS!

WRITE FOR OUR BULLETIN No. 81!

PATS. PEND.

CHARLES E. WOOD COMPANY

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A complete service for the lime, crushed stone and associated industries.

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60"x48" to 6"x3"

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"Farrel-Bacon" Jaw Crushers

BACON-PIETSCH CO., INC.

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2—WORTHINGTON AIR COMPRESSORS, Model M-80, 445 cu. ft. displacement, 100# pressure. "V" belt driven by 75 HP 220/440 volt motors.

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1—WILEY 25-TON MODEL E STEEL STIFFLEG DERRICK with 60' boom, 30' mast.

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4—INGERSOLL-RAND AIR COMPRESSORS, portable, 600 cu. ft., gas and diesel. Good Cond. Cheap.

7—AIR COMPRESSORS, portable, 315 cu. ft. Good Cond. Cheap.

Please contact your nearest ECA office

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SCREEN FOR SALE

Seco double deck 4'x8' screen with ball tray attachment. This screen less than 2 years old—used very little and in excellent shape. Offered with drive and motor complete. At ½ off, located near Chicago. No dealers.

BOX N-94, ROCK PRODUCTS

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HERCULES JXD ENGINES

U. S. Surplus - $245.00

Unconditionally Guaranteed

Complete Less Accessories

FORBES MOTOR CO.

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1—Allis-Chalmers 8'x7'x22' two compartment mill and motor.
2—New 6½' x 150' Kilns.
1—Complete Lime Hydrating Plant.
1—6 Williams Jumbo hammermill.

KILNS

1—4' x 40', 9' x 120', Kilns.

DRYERS

1—4½' x 50', 7' x 60', 8' x 125'.

CRUSHERS

1—48" x 60", 36" x 42", 30" x 36", 24" x 36", 18" x 36", 12" x 24" Jaw Crushers.
2—42" x 16" Allis-Chalmers Crushing Rolls.
1—48" Telsmith Gyrasphere crusher.
36" x 16 rebuilt Sturtevant rolls.
2—24" x 14" Rogers Iron Works Crushing Rolls, Rebuilt.
1—24" x 12" Farrell Bacon Crushing Rolls.
1—Sturtevant #2 duplex ring roll mill.
1—6", 10", 16" and 20" McCully Superior Gyratory Crushers.
No. 3 up to No. 12 Gyratory Crushers.

BALL, ROD & TUBE MILLS

1—7'x8', 6'x12', 5½'x10, 8'x6' Ball Mills.
2—5'x16'; 1—5½'x10' Rod Mills.
2—5½'x20', 5'x22', 48'x22' Tube Mills.
2—6'x22' Compeb Mills—6'x22' Tube Mills.
1—10'x48" Hardinge Mills.
3—3-Roll Bradley Hercules Mills, Direct Connected to 500 HP Motors.

MISCELLANEOUS

1—14' or 6' Air Separators.
1—6'x4', 12'x10' Oliver Filters.

We make new dryers and kilns.

Have you any machinery that you want to sell?

W. P. HEINEKEN, INC.
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Save on Your INDUSTRIAL TRACK

FOSTER QUALITY — FULLY GUARANTEED

RELAYING RAILS

Handle more cars better—cost less to install and maintain. Foster stocks all Rail Sections 12# thru 175#, Switch Material and Track Accessories.

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PITTSBURGH 30 • NEW YORK 7 • CHICAGO 4
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New — RAILS — Relaying

All sections available together with all accessories. Also interested in purchasing surplus equipment you may have available.

M. K. FRANK
480 Lexington Ave., New York, New York
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1—39x42 Buchanan Jaw Crusher, Blake Type.
1—24x36 Telsmith B. B. Jaw Crusher with 3'x12' Feeder.
1—10" Telsmith Gyratory Crusher.
14-36 Acme Jaw Crusher.
10-20 Crusher, Blake Type.
3—42" Telsmith Gyratory Crusher.
1—84" Telsmith Gyrasphere Crusher.
16"x16" New Holland Double Roll.
1—60"x24" New Holland Rolls.
1—7x10 Allis-Chalmers Crusher, Blake Type.
1—15" Intercone Crusher.
1—5' Simmons Cone Cr.
1—3'x10' D.D. Telsmith Screen.
1—4x12 S.D. Telsmith Screen.
60" Telsmith Sand Drag.
1—Model 583 Barber-Greene Bucket Loader.
6—Ton Huber Roller, Three (3) Wheel.

BLUE BALL MACHINE WORKS
Blue Ball, Pa.

POSITION WANTED

Mining Engineer, 36, B.S., Mine E, Registered Professional Engineer, 16 years, broad experience all phases of quarrying and open pit mining-supervision, engineering, cost control, etc.—seeks responsible position with progressive organization. Now employed, available reasonable notice. Reply to

BOX N-86, ROCK PRODUCTS
79 W. Monroe St. Chicago 3, Ill.

FOR SALE

One used Bergan Pallet Cleaner, complete with three (3) complete sets of Star Wheels. $1000.00 F.O.B. Napa, California.

BOX N-98, ROCK PRODUCTS
79 W. Monroe St. Chicago 3, Ill.

WANTED

#480 Marion electric Shovel with Ward-Leonard Control.

BLUE ROCK, INC.
Box 110 Washington C.H., Ohio

CONVEYOR EQUIPMENT WANTED

Would like to buy approx. 3000 Ft. 36" and 2000 Ft. of 24" used conveyor direct from former user. Will consider purchase of smaller amount in large quantity. Write telling where we can inspect.

BOX N-64, ROCK PRODUCTS
79 W. Monroe St. Chicago 3, Ill.

POSITION WANTED—Administration in operation or engineering. 17 years experience in the industrial minerals field, of which 10 years were in the Portland Cement Industry. Engineering Graduate, late thirties, now employed. Salary Open. BOX N-61, ROCK PRODUCTS, 79 W. Monroe St., Chicago 3, Ill.

ENGINEERING GEOLOGIST

Carry on field investigations and geological studies for portland cement manufacturer for purpose of developing new sources of raw materials and extending knowledge of present deposits. Will headquarter in an Eastern state, but must be free to travel. Will consider recent graduates as well as experienced applicants. Must have degree. Give full details on experience, training, personal data and salary desired in first letter.

BOX N-97, ROCK PRODUCTS
79 W. Monroe St., Chicago 3, Ill.

FOR SALE

Model 41 C, 30 D.W. Direct Connected Diesel Generator Set.

8-Cubic Yd. Dipper Dredge. Machinery.

18" Portable Hyd. Steel Hull Diesel Dredge.

24" Diesel Dredge "New in 1951".

12" Dredge Pump Direct Connected to 300 H.P. Motor.

1—20" Dredge Pump.

H. P. GUION
DREDGE BROKER
6030 Riverdale Ave., New York 17, N.Y.
Phone Kingbridge 9-8245

WANTED

Men with experience in gypsum industry for supervisory positions at plant in Southern Nevada.

BOX N-83, ROCK PRODUCTS
79 W. Monroe St. Chicago 3, Ill.

WANTED

QUARRY FOREMAN—experienced, for small quarry.

Wanted immediately.

GEORGE HOFFSTETTER
Jerseyville, Ill.

FOR SALE

CLASSIFIER Dorr 26' bowl with 5' x 30' rakes.

Available at special price before removal.

G. & W. H. CORSON, INC.
Plymouth Meeting, Pa.

Partner wanted in going building block plant. Need more money for expansion. Have $75,000 invested in plant. Write to:

AUGUST PETRICH
202 West 3rd Street Cle Elum, Washington

We have a Glacial deposit of Sand and Gravel located in a non-competitive area in Penna. It meets all commercial laboratory tests and Penna. State Highway Specifications. $250,000 in profits can be realized annually.

We need co-investor.

BOX O-1, ROCK PRODUCTS
79 W. Monroe St. Chicago 3, Ill.

PROJECT ENGINEER WANTED

Graduate Mining, Metallurgical, Chemical or Mechanical Engineer, preferably 25 to 35 years old, wanted by medium size progressive heavy machinery manufacturing company, located in South eastern Pennsylvania. To assist in design and preparing for market of various lines of equipment used in mineral dressing, heavy chemical, cement and rock products industries. Must have had engineering and field experience, and be willing to work on drafting board, travel and to do field service. Opportunity also exists for a properly qualified individual, eventually to become sales engineer. Salary open.

BOX N-65, ROCK PRODUCTS, 79 W. Monroe St., Chicago 3, Ill.

ALSO SEE READY-MIXED CONCRETE AND CONCRETE PRODUCTS EQUIPMENT
WHERE TO BUY ADVERTISING IN CONCRETE PRODUCTS SECTION

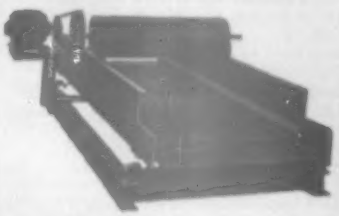
BONDED EQUIPMENT BARGAINS

IMMEDIATE SHIPMENT FROM OUR FACTORY — WRITE, WIRE OR PHONE

NEW BONDED® HEAVY DUTY VIBRATING SCREENS

Model Number	Screening Area	No. of Decks	Sale Price
124AS	2' x 4'	1	$ 355
224AS	2' x 4'	2	375
126AS	2' x 6'	1	375
226AS	2' x 6'	2	395
136AS	3' x 6'	1	495
236AS	3' x 6'	2	585
336AS	3' x 6'	3	815
138AS	3' x 8'	1	575
238AS	3' x 8'	2	695
338AS	3' x 8'	3	845
138BS	3' x 8'	1	1119
238BS	3' x 8'	2	1165
338BS	3' x 8'	3	1358
248BS	4' x 8'	2	1895
348BS	4' x 8'	3	1850
2410BS	4' x 10'	2	1775
3410BS	4' x 10'	3	2095
3412BS	4' x 12'	3	2395

NEW BONDED® GENERAL DUTY VIBRATING SCREENS



For mineral, chemical and other industrial products. Fast, efficient and economical for cleaning, sizing, grading, dewatering. Made in all metals including stainless steel. Enclosed models for hot materials or dust control. Bonded screens are built for any screening operation, wet or dry. HEAVY DUTY MODELS, TYPE BS: 4-bearing positive throw, eccentric shaft; 3' x 8' to 5' x 14', 1 to 5 decks. GENERAL DUTY SCREENS, TYPE AS: eccentric weight mechanism, spring mounted, 1 to 3 decks, 2' x 4' to 3' x 8'. Write for new 8-page Bulletins 1086 and 1087.

BONDED CARRIES LARGE STOCKS OF SCREEN CLOTH FOR IMMEDIATE SHIPMENT

NEW BONDED® TROUGHING IDLER CONVEYOR BARGAINS

Complete Ready-Fab sections quickly and easily joined together on the job. We take our loss on our stock of short length belting. You can save as much as 50% on the BONDED CONVEYOR SPECIALS listed, with conveyor belting in two pieces. Conveyors are equipped with 5" roll diam. idlers and return rolls 20" diam. head pulley and 16" diam. tail pulley mounted on 2 1/4" or 2-7/16" diam. shaft. Belt is new 4-ply, 28-oz. duck, 1/8" top rubber cover x 1/32" bottom cover and is fresh stock made by leading manufacturers.

CONVEYOR PRICES INCLUDE BELTING

Belt Width	Length of Conveyor	List Price	Sale Price
14"	25'	$1166	$ 672
14"	50'	2016	1064
16"	45'	1928	1012
16"	60'	2494	1264
18"	25'	1327	739
18"	45'	1986	1085
18"	85'	3466	1798
20"	25'	1366	770
20"	60'	2762	1426
24"	25'	1428	835
24"	45'	2227	1237
24"	100'	4425	2339
24"	130'	5624	2995
30"	50'	2669	1504
30"	70'	3576	1971

For conveyors longer or shorter than those listed above, add or deduct the following per foot prices according to belt width. Prices include belting.

For 14" belt.....$15.66 per foot
For 16" belt..... 16.78 per foot
For 18" belt..... 17.20 per foot
For 20" belt..... 18.95 per foot
For 24" belt..... 20.66 per foot
For 30" belt..... 23.02 per foot

BONDED CONVEYOR ACCESSORIES

All Bonded Troughing Conveyors (described above) can be equipped with Bonded Accessories or use them on your present Conveyor or Bucket Elevator.

Holdback $90.00

Guide Idler $13.75

Wing Pulley $74.00

NEW CONVEYOR BELTING SAVE UP TO 25%

Heavy duty 4-ply, 28 oz. duck, 1/8" top rubber cover x 1/32" bottom cover rubber belting having high tensile strength, tough cotton duck, strong carcass and proper flexibility. For heavy boxes, bags and bulk materials. Troughs easily. Famous brands at deep cut prices. Fresh stock.

Width	List Price	Sale Price
14"	$3.43 foot	$2.75 foot
16"	3.86 foot	2.88 foot
18"	4.27 foot	3.19 foot
20"	4.69 foot	3.69 foot
24"	5.55 foot	4.14 foot
30"	6.77 foot	5.06 foot
36"	8.01 foot	6.00 foot

Additional widths and plies available at low prices. Write for free sample.

NEW BONDED® FEEDERS

For high tonnage and controlled feed of Aggregate, Sand, Gravel, Crushed Stone, Clay products, Metallic Ores, Coal, Cinders and almost any other bulk material to Crushers, Screens, Conveyors, Mills and other process machinery. Feeder may also be driven from tail shaft of Bonded® Troughing Idler Conveyors thus eliminating the necessity of two motors. Capacities to 225 tons per hour. Full information in Bulletin 938. Write for it.

Priced from $280.00

NEW BONDED® FLIGHT CONVEYORS

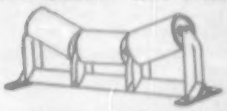
Heavy Duty Flight Conveyor

Mounted Mobile Tire-Drag Chain Conveyor

Bonded flight conveyors are made in portable and stationary models. Any length. Flight sizes up to 8" x 24". Made of welded structural and sheet steel with heavy duty double guided chain.

Priced from $421.00

NEW IDLERS AND RETURN ROLLS 25% BELOW LIST PRICE



3-roll, 5" diameter Troughing Idlers for:

14" belt	$17.25	24" belt	$19.75
16" belt	18.00	30" belt	20.50
18" belt	19.00	36" belt	21.25
20" belt	19.25	48" belt	23.75

1-roll, 5" dimeter Return Idlers for:

14" belt	$6.75	24" belt	$ 8.00
16" belt	7.00	30" belt	8.75
18" belt	7.50	36" belt	9.25
20" belt	7.75	48" belt	10.75

All steel; Interchangeable with other well-known makes. Replaceable ball bearings. Either sealed type (pre-lubricated) or with alemite fittings. Maintenance is negligible.

NEW BONDED® CINDER, STONE, PUMICE, PERLITE CRUSHERS

Bonded double roll crushers are available with Tooth, Smooth, Fine or Coarse Corrugated rolls or any combination of same for crushing Lightweight Aggregate, Pumice, Perlite, Chemicals, Limestone Chips, some Stone and similar materials. Capacities to 500 tons per hour. Write for new eight page Bulletin 1119.

Priced from $479.00

NEW BONDED GEAR REDUCERS

H.P. At 20:1 Ratio	H.P. At 30:1 Ratio	Price
3	2	$ 81
5	3	142
10	7 1/2	228
15	10	286
20	15	394
25	20	468
30	25	575
40	30	750
60	50	925

Reducers are right angle with worm on bottom (underdriven) and all models are fan cooled by means of a radial fan. Reducer will operate in either direction. Other sizes and ratios available at bargain prices.

VISIT THE BONDED FACTORY ANY TIME — BONDED MACHINES AVAILABLE ON TIME PAYMENT PLAN

BONDED SCALE AND MACHINE COMPANY

PHONE: Hickory 4-2186 Days; 128 BELLVIEW

WRITE FOR FREE CATALOG AND PRICES

Mfgrs. of Scales, Conveyors, Conveyor Parts, Idlers, Vibrating Screens, Crushers and Feeders

PHONE: AXminster 1-2213 Evenings COLUMBUS 7, OHIO

SHOVELS - DRAGLINES DRILLS - TRACTORS TRUCKS

190-B Bucyrus-Erie Electric 8 yd. shovel.
170-B Bucyrus-Erie Electric Hi-Lift 5 yd. shovel.
1600 P&H yd. electric shovel.
2400 Lima 6 yd. diesel shovel.
2400 Lima 4 yd. Hi-Lift shovel.
120-B Bucyrus-Erie electric 5 yd. shovel.
1400 P&H 4 yd. electric shovel.
111-M Marion 3½ yd. diesel shovel.
4161 Marion 5 yd. electric shovel. Worked about three years.
1201 Lima 3½ yd. Diesel Shovel.
1201 Lima Hi-Lift diesel shovel 42' boom. 32' stick, 2½ yd. dipper.
1201 Lima Semi-Hi-Lift diesel shovel, 36' boom, 27' stick, 3 yd. dipper.
3500 Manitowoc Hi-Lift diesel shovel 45' boom, 35' stick, 2 yd. dipper.
111-M Marion Hi-Lift diesel shovel 43' boom, 23' stick, 3 yd. dipper.
40-A Marion Hi-Lift diesel shovel 45' boom, 34' stick, 2½ yd. dipper.
450-W Bucyrus-Erie diesel dragline 165' boom, 13 yd. bucket.
625 Page diesel dragline 150' boom, 9 yd. bucket.
5-W Bucyrus-Erie diesel dragline 125' boom, 5 yd. bucket.
2400 Lima diesel dragline 130' boom, 5 yd. bucket.
4500 Manitowoc diesel dragline 120' boom, 5 yd. bucket.
1055 P&H diesel dragline 80' boom, 4 yd. bucket.
1201 Lima diesel dragline 85' boom, 3 yd. bucket. Independent boom hoist.
3500 Manitowoc diesel dragline 85' boom, 2½ yd. bucket.
600 Reich Heavy truck mounted rotary air drill.
50R B-E Blast Hole Drill—drills up to 12" hole.
Quarrymaster Drill with 2—500 cu. ft. compressors.
58-BH Joy Champion Rotary Air Drill.
56-BH Joy Middle Weight Rotary Air Drill.
Also 42-T, 29-T, & 27-T Well Drills

Many Good Used Trucks

Frank Swabb Equipment Co., Inc.
313 Hazleton Nat'l Bank Bldg.
Hazleton, Pa., Gladstone 5-3650

ASSISTANT QUARRY SUPERINTENDENT

QUARRY ENGINEERS

Leading Producer of Sand and Gravel in Chicago area needs several experienced men to assist superintendents of large volume quarry operation leading to top responsibility in near future.

Some engineering or equivalent and actual responsibility for production and supervision preferred.

Opportunity for promotion, good salary, retirement income, insurance plans and bright future.

Reply giving personal and work history, and salary requirements.

BOX N-100, ROCK PRODUCTS
79 W. Monroe St. Chicago 3, Ill.

PUMPS: 1—500 H.P., 5500 GPM and one 200 H.P., 2000 GPM, all bronze; both 280' head, 2300 volt, with controls.

PAN FEEDERS: 1—Manganese Pan Feeder, heavy duty, 60"x15 ft. with 20 H.P., 220/440 volt motor, speed reducer, V-belt drive. Condition like new. 1—Link Belt heavy duty ore or Rock Feeder, 36"x10 ft., 5 H.P. motor, speed reducer and drive. 1—Apron Pan Feeder 48" wide, 110 ft., 75 FPM, lift 20 ft., 100 H.P., 220/440 volt motor, Jones Speed Reducer, 65 H.P., ratio 28.7, with structural support.

REDUCTION CRUSHERS: Allis Chalmers R548 Hydrocone, with large stock new parts. Condition like new. Will sell parts separately. Symons 3 ft. Cone Crusher, standard, with 25 H.P. motor and drive.

JAW CRUSHERS: Allis Chalmers 18x36" sectionalized for underground use, V-belt, 50 H.P., 220/440 volt motor, new condition. Also, 40 x 60", 43 x 46", 36 x 48", with or without motors and drives. Other sizes from 4" x 6" to 48" x 60".

SHOVEL FRONT for Bucyrus Erie 54-B, 2½ yd. NEW condition.

OVERHEAD ELECTRIC CRANES: 1-10 ton, 54' span, 4 motor, bucket operating, 440 volt, AC. cab control. Other cranes AC and DC 5 ton to 150 ton.

LOCOMOTIVE CRANE: 25 ton capacity, standard gauge, gasoline powered, cast steel trucks, air brakes, with or without 1¼ yd. Williams clam shell bucket, thoroughly modern, excellent condition. Located Minnesota. For sale or rent.

MINE HOISTS: Single and double drum, 100 to 1500 H.P., with all elec. equip. Complete specs., drawings, photos available.

HOIST MOTORS:
300 H.P., 435 RPM. 600 H.P., 710 RPM.
600 H.P., 585 RPM 1200 H.P., 444 RPM.
2300 volt, A.C. with controls.

We Buy and Sell Equipment Throughout North and Central America

A. J. O'NEILL
Lansdowne, Pa.
Phila. Phone: MAdison 3-8300—3-8301

CORE DRILLING
--anywhere!
"We look into the earth"
PENNSYLVANIA DRILLING COMPANY
Pittsburgh 20, Pa.

WANTED

Belt Conveyor—Approx. 600'—for Sand and Gravel Installation. Troughing and Return Rollers, Pulleys and Belt 18" to 24". What have you? Give details and price.

E. F. LIPPERT & CO.
R. F. D. 1, Allegany, N. Y.

MOTORS AND GENERATORS

All sizes, new and rebuilt. Starters, accessories, pulleys and repair parts. Gear motors, Falk Shaft mounted Speed Reducers, couplings and V-belt drives.

Expert Repair Service

NUSSBAUM ELECTRIC COMPANY
220 E. Douglas Ave., Fort Wayne, Ind.

Attention Brokers, Steel & Glass Producers

15 to 30 million tons of high calcium limestone for sale eight miles south of Winchester, Virginia, parallel and adjacent to B. & O. Railroad. Option for core drilling, five percent of sale price and six month option granted.

Price: $125,000.00

ROBERT E. O'NEAL
MIDDLETOWN, VIRGINIA

WANTED

Maintenance Superintendent. Must be familiar with power shovels and stone crushing and screening equipment. Must be capable taking full charge of Machine Shop in Stone Quarrying and Crushing Operation. Location in Eastern State. Please advise experience and salary expected.

BOX N-85, ROCK PRODUCTS
79 W. Monroe St. Chicago 3, Ill.

SURPLUS EQUIPMENT

Available throughout the U.S. — Items you need may be available near you. Your inquiries would be appreciated.

Buildings	Derricks	Loaders	Pavers
Bins	Draglines	Locomotives	Rollers
Barges	Ditchers	Mixers	Rail
Buckets	Dredges	Motors	Scales
Belting	Drills	Mills	Screens
Cableways	Engines	Machine-tools	Stacklines
Cars	Excavators	Pipe	Shovels
Compressors	Feeders	Pulverizers	Tanks
Conveyors	Graders	Pumps	Tractors
Crushers	Generators	Kilns	Trailers
Dryers	Hoists		Etc., Etc.

(I can sell your surplus equipment)

ALEX T. McLEOD
MARIETTA, KANSAS

FOR SALE or RENT

25 ton Whitcomb Diesel Locomotive 1949.
50 ton Whitcomb Diesel-Elec Locomotive.
140 HP Christian 2D Diesel Hoist & Swinger.
10 ton Unit #1020 Mobile Motor Crane.
25 ton Amer. Diesel Locomotive Crane.
25 ton American Steel Guy Derrick.
30 ton Steel Stiffleg Derrick & Hoist.
1¼ yd. Manitowoc 2000B Diesel Crane 1948.
2½ yd. Manitowoc 3500 Diesel Crane 1948.
3½ yd. Lima 1201 Shovel-Dragline.
5 yd. P&H 1400 Diesel Shovel 1950.
2200 CFM C-P OCE Air Compr. 350 HP.

Mississippi Valley Equipment Co.
513 Locust St. St. Louis 1, Mo.

WANTED

2—Letourneau Model FP or Caterpillar 80 or 90 Tractor Drawn Scrapers used—Single Wheels preferred.

CAMPANELLA & CARDI CONSTRUCTION CO.
780 Jefferson Blvd. Hillsgrove, R. I.

KEEP ABREAST
WITH
INDUSTRY TRENDS
THROUGH
ROCK PRODUCTS

WANTED

3' SYMONS SHORT HEAD CRUSHER

Coarse Bowl

BOX N-77, ROCK PRODUCTS
79 W. Monroe St. Chicago 3, Ill.

FOR SALE

Jeffrey 24' x 20' Hammermill, purchased 1949. Type B3. Excellent condition. Used only as standby unit, now surplus. Price: $1250.00 F.O.B. Denver.

The Robinson Brick & Tile Co.
500 S. Santa Fe Drive Denver 23, Colo.
Phone: Sherman 4-3371

ROTARY DRYERS & KILNS: 3'x24'; 4'6"x40'; 5'x30'; 10'6"x105'.
BUCKET ELEVATORS: (6) 20' H to 56' H.
Screw Conveyors, Trough Belt Conveyors, Pan or Apron Conveyors.

PERRY EQUIPMENT CORP.
1418 N. 6th St. Philadelphia 2, Pa.
Stevenson 4-7210

WANTED

48 x 60 Jaw or 42" Gyratory Crusher. Will Consider Larger Size. Request Location and Price.

BOX N-96, ROCK PRODUCTS
79 W. Monroe St., Chicago 3, Ill.

ALSO SEE WHERE TO BUY ADVERTISING ON OTHER EQUIPMENT IN WHERE TO BUY ADVERTISING IN CONCRETE PRODUCTS SECTION

P&H Mdl. 1400DE 8-cy. Diesel Electric Shovel, New 1950, Cooper Bessemer diesel, 36" shoes, 19' track, 5 & 6.56 cy. dippers, excellent. $75,000.

MARION 362 Shovel 1½ cy, w/Cat. D13000, excellent. $18,750.

CEDAR RAPIDS 18x36 r.b. Portable Jaw Primary Plant w/3x12 apron feeder, 30"x30' underconveyor, mounted factory tandems, pneu. tires, front dolly, Buda 844 DC diesel. Excellent. $12,750 Rental Purchase.

UNIVERSAL Portable Secondary Plant w/36x12 r.b. Roll, #3 hammermill, 4x12 2-deck Screen, Wheel return, diesel power, 30" conveyors, mounted tandem pneu. tires. A1. $15,000 Rental Purchase.

CEDAR RAPIDS Portable Gravel Plant w/10x24 r.b. Jaw Crusher, 24x16 rolls, 3x10 vib. screen, Cat. D4600, mounted tandem rubber. $9,000 rental purchase.

AUSTIN WESTERN 4x40 r.b. Jaw Crusher, used 60 days. $1650 Yard.

LIPPMANN 24x36 r.b. Jaw Crusher. $4500.

TELSMITH 10x36 r.b. Jaw Crusher, good. $1850.

PIONEER 10x30 r.b. Jaw Crusher, good. $1250.

CEDAR RAPIDS 10x16 Jaw Crusher on pneumatic tired tractor. Good. $850.

GILSON #14 hammermill, 95% new. $500.

SIMPLICITY 4x10 3-deck Vib. Screen. $1750.

WENZEL MACHINERY CO.
Mayfair 1710
565 S. 10th Kansas City, Kans.

FOR SALE OR RENT—EASY TERMS
Rebuilt—A1 Condition
488 Bucyrus Erie Shovel 2 cy diesel Model
6 Northwest Shovel 1½ cy.
WILLIAMS CONSTRUCTION CO.
Box 145 Murdock 6-6600 Baltimore 20, Md.

Rotary Dryer 40"x21' anti friction complete with hoods, etc.
5'x40' Dryer-New Shell.
7'x70' Rotary Cooler.
10x18 Reliance Jaw Crusher.
9x15 Dodge Lever Type Jaw Crusher.
10x18 Acme Road Machy. Jaw Crusher.
15x36 Cedar Rapids Overhead Ecc. Jaw.
Deister Plato D.D. Screen 4x6.
Hummer Type 31 D.D. Screen 6x5.
Cedar Rapids D.D. Screen 3x10.
Tyler Hummer Generator Sets.
16" Enc. Cont. Elevator, Chain, 55'C.
20" Enc. Cont. Elevator, Chain, 75'C.
Barber-Greene 12" Bucket Loader Pneumatics, swivel conv.
New & Used Elev. Buckets, all sizes.
Elevator Chain, all sizes.
135—48" Trough Idlers, antifriction.
106—42" Trough Idlers, antifriction.
Apron Conveyor 24"x42'.
Apron Feeder 18"x11'.
Apron Feeder 18"x5½'.
16"x34' Hains Trough Port. Conv.
40"x16' Jeffrey Package Conveyor.
250' 22" Gravity Conveyor.
50'x16" Encl. Screw Conveyor.
45'x16" Encl. Screw Conveyor.
84'x12" Encl. Screw Conveyor.
30 Cu. Ft. Dry Mixer with Skip Hoist.
42"x12' Air Tank ½" Shell.
Dings Magnetic Pulley 24x24 Perm. Type.
Brosius Single Line Bucket, ½ yd.
Spencer Turbo Compressors, 1 to 5 HP.
Spencer Turbo Vacuum Cleaner 3 HP.
Simplex Oil Burner Blowers 3 HP.
15 Ton Stiffleg, 30' Extension.
G. A. UNVERZAGT & SONS INC.
136 Colt St. Irvington, N.J.

QUARRY EQUIPMENT

Pioneer 3042 primary crushing unit with feeder, etc.
Cedarapids 3240 primary crusher. New Condition.
Cedarapids 4033 hammermill secondary unit. Rebuilt.
Cedarapids 4023 hammermill. Rebuilt.
Cedarapids 2033 hammermill.
Cedarapids 42" x 10' apron feeder.
Williams 20" pulverizer.
Austin-Western 15x24 jaw.
Cedarapids 4' x 12' double deck screen.
Niagara 5' x 12' triple deck screen.
Cedarapids 3' x 8' double deck screen.
15 cu. yd. Cedarapids sand drag. New.
New 12" x 35' inclined open elevator.
60-ton, 2-comp., 9' x 15' storage bin with clam gates.
Special bins to your specifications.
Conveyors—18"-24"-30"-36". Also belting.
18" dia. x 20" face magnetic pulley.

SHOVELS AND CRANES

Lorain 820, 2-yd. diesel shovel, crane, drag.
Brownhoist 1-yd. gas shovel-crane.
Lorain MC-414 20-ton truck crane.
Lorain MC-254-W 17½-ton truck crane.
Lorain TL 20 4x2 self propelled.
Lorain Model 30, ½-yd. crawler shovel-clam.
Speeder Model 60 Shovel, Hoe, Clam.
Unit Model 614 diesel backhoe.
Unit Model 514 Gas backhoe.

TRACTOR, TRUCK, SCRAPERS, ETC.

8—Euclid rear dumps, 22 ton. Good condition.
3—Cat DW10 scrapers. Good condition.
1—Cat D-7 with bulldozer blade.
1—Allis-Chalmers HD-19 crawler with Carco blade.
1—Allis-Chalmers HD-10 with Baker bulldozer.
1—Int. TD-18 with Bucyrus-Erie bulldozer blade.
1—Int. TD9 w/front shovel attachment. Reconditioned.
1—Woodridge 15-18 yd. Model TCR scraper.

DIESEL POWER UNITS

Caterpillar D7700, 53 H.P. @ 1800 RPM. Rebuilt.
Caterpillar D13000 6-cyl. diesel engine, Twin Disc clutch, extended shaft, outboard bearing, 145 H.P. @ 1000 RPM. Rebuilt.
Caterpillar D17000 8-cyl. diesel engine with Twin Disc clutch, 190 H.P. @ 1000 RPM.
GMC 6-71 diesel engine radiator to and including clutch, 130 HP @ 1600 RPM. constant duty, electric starting equipment. New condition.
GMC 12-cyl. twin diesel engine complete from radiator to and including automotive type clutch with gear reduction unit, fabricated base, electric starting system, 200 H.P. @ 1200 RPM. New Condition.

ASPHALT PLANT

Barber-Greene Model 848 with drier, graduation unit, etc.

AIR COMPRESSORS

500 Cu. ft. Gardner-Denver diesel, rebuilt.
365 Cu. ft. Gardner-Denver diesel, rebuilt.

L. B. SMITH, INC. Camp Hill, Pa.
Phone Harrisburg REgent 7-3421

DEPENDABLE USED MACHINES

Special:—Harris "Power Horse"; 4-wheel drive; 2½ yd. bucket; cab; used 3 months.

A-W ½ yd. shovel	Pioneer port. Diesel gravel plant	Lessman loader
Speeder ½ yd. dragline	Pioneer-Mesabi 5x12 d.d. screen	40' bucket elevator
Link Belt ⅝ yd. dragline	Cedar Rapids 16x16 roll crusher	45 ton port. bin
Lorain ¾ yd. dragline	Bay City ½ yd. Diesel backhoe	2x6 screen
Lima 2 yd. dragline	Koehring 1¼ yd. dragline	Eagle cinder crusher

These machines reconditioned in our newly-built daylight plant. Come see them.
10030 Southwest Highway TRACTOR & EQUIPMENT CO. Oak Lawn, Ill.

EQUIPMENT BARGAINS
ALL OVER THE COUNTRY

84x96jaw crusher—30" & 36" Sup. McCully gyratories — Cedar Rapids Jr. port. washing plant—Cedar Rapids port. 2025 primary with feeder, conveyor $11,500—Austin 7½ gyratory 6 x 22 Allis-Chalmers compeb mills—54" x 28' Eagle double screw classifier—8x123 rotary dryer—7x110 kilns—6x74 rotary coolers—44 ton diesel electric locomotive $19,500—85 ton G.E. trolley locomotives—1000 hp Fairbanks Morse direct reversible marine diesel engine $22,500—36 ton outside overhead electric traveling crane 60' span—American revolver model R-10 55,000 lbs at 25' radius—30 ton diesel locomotive crane—Koehring 601 combination $14,000—120 B combination $65,000—3½ yd. Mentzhan walker $44,000—N.W. 6 dragline $11,500—N.W. 95 dragline $16,500—120 B electric dragline $57,800—P & H 655 dragline $25,500—Link belt K 595 dragline $40,000—Marion 111 M dragline $68,250—N.W. 98 D shovel $24,500.

STANLEY B. TROYER EQUIPMENT CO.
Box 67 Crosby, Minnesota Phone 500

B-E 5OR DRILL—ELECTRIC

Set for 9⅞" Holes.

Used only 1100 Hours.

Practically like new.

Bargain.

Frank Swabb Equipment Co., Inc.
313 Hazelton Nat'l Bank Bldg.
Hazelton, Pa. Gladstone 5-2658

FOR SALE

Sauerman 1 yd. double drum roller bearing hoist s/n 2066.
1 crescent scraper bucket, 8, 16" Sauerman sheaves.
This hoist has only 1,800 hours use.

GEORGE F. WEAVER
Hagerstown, Ill.

Lancaster 6' dia. Vert. Mixer 20 HP.
Kent Model #2 Continuous Mixer.
Abbe 37" x 20' Ball Mill Chrome-Mang. lined.
Raymond #00 and #1 Pulverizers.
Kilns, Dryers, Filters, Hammer Mills, Crushers.
SEND FOR COMPLETE LISTINGS.

STEIN EQUIPMENT CO.
107 8th St., Brooklyn 15, N. Y.
Tel: Sterling 8-1944

FOR SALE

1 portable ten inch suction dredge mounted on two new steel pontoons 40 x 8 x 3. Ten inch Morris pump powered by pair of new G.M. 671 diesels.

Contact:

H. L. O'DELL, New Boston, Ill.

Rotary Drill Supplies in Stock at Columbus, Ohio. Subs, Spiral Reamers, Drill Pipe and Rotary Bits.

THE WHITE ORR CO.
766 Northwest Blvd. Columbus 8, Ohio

WANTED

42" Allis-Chalmers McCully Superior Gyratory Crusher—two way discharge.

BOX N-87, ROCK PRODUCTS
79 W. Monroe St. Chicago 3, Ill.

WANTED

Superintendent for large Stone Quarry and Crushing Operation. Must be qualified to do blasting and to supervise entire operation. Location in Eastern State. Please advise experience and capabilities and salary expected.

BOX N-84, ROCK PRODUCTS
79 W. Monroe St. Chicago 3, Ill.

SHOVELS — CRANES — DRAGLINES

Bay City 65 Shovel-Backhoe-Crane, 1½ yd. Diesel.
B-W 86-D 2½ yd. Dragline. Diesel, 100' boom.
B-W Model 6, 1½ yd. Diesel Shovel.
Northwest 80-D Diesel Shovel 2½ yd. New 1952.
Lorain L-820 2-yd. Shovel-Drag-Crane 100' boom.
Lima 1201, 2½ yd. Diesel Shovel.
Manitowoc 3500, 2½ yd. High Lift Shovel.
Buc-Erie 84-B Diesel Shovel, 2½ yd.
Manitowoc 3500 Dragline, 140' boom, new 1960.
Northwest 25 Diesel, ¾ yd. Shovel.
Lima 504 Backhoe-Crane-Drag. Cat. D12000 Diesel.
Lima 604 Drag. Diesel 95' boom; New 1954.
B-W 95, Drag., New 1951. Murphy Diesel 80' bm.
B-W 6, Crane-Drag. New 1951. Murphy Diesel
Koehring 605 Shovel-Crane-Dragline Cat. D12000

CRUSHERS

JAW: Acme 10x20, 14x26, 14x28, 10x42, 16x36, 18x32, 25x42, Eagle 20x36, Diamond 24x36", Cedar Rapids 10x28, 20x36, 25x40, Farrell 10x20, 12x30, 14x32, 18x36, 36x48, Buchanan 36x42, Good Roads Reliance 15x30, Traylor 15x24, 24x36, Allis-Chalmers 30x18, Good Roads 20x36, Traylor 42x48, Traylor 48x66, 42x48, Allis-Chalmers 42x48.
GYRATORY: Allis-Chalmers-McCully, 6", 7½", 8", 9", 12½, 20", 36", 42", 14" Newhouse, 36", 60", Gyrasphere, 18", 28" Intercone Telsmith, Telsmith 6-H, 10-H, 18-H, 16-H, Kennedy Van Saun 7, 10, 20 ¾-ft, 27, Traylor Ty 24", Ty 60", T-6042.
ROLL: Cedar Rapids 40x20, Pioneer 40x22, Pioneer 30x18, Telsmith 24x16, Pioneer 50"x18", New Holland 24x16, Pioneer triple 40"x22" A-C 42"x16".
HAMMERMILL: Size 4 Williams Jumbo, Pennsylvania HX2, 22x22, Cedar Rapids 20x20, Jeffrey 36x42, 36x24, 36x40, Penn 8XH-100, Cedar Rapids 20x20.
BALL MILL: Hardinge 10'x48", K.V.S. 6'x8' Type M Air Swept J-H 6'x6', Hardinge Conical 6'x22', Colorado Iron Works 5'x6'; Marcy No. 66½, Hardinge conical 10'x36".
ROD MILL: March 2'x6', 3'x6', Allis-Chalmers 4'x8', Hardinge No. E 5064, Marcy 6'x19', Hardinge 5'x22", Jackson & Church 4'x10' 10 ton rods, new.
CONE: Symons 2' and 3' coarse head.
KILNS: 4'x42', 5'x250', 6'x50'6", 6'4"x45', 7'x110' 10'6"x105'.
DRIERS: Vulcan 4½x50', others 1'x20', 6'x24', 7'x70', 6'x40' and Cedar Rapids 60"x24'.

CRUSHING PLANTS

Cedar Rapids "Pitmaster" port. washing-screening.
Cedar Rapids Portable Super Tandem, excellent.
Austin Western port. Model 101, New 1952.
Pioneer 305W, crushing, washing, screening.
Cedar Rapids 40x23 Port. Secondary, Diesel.
Universal Model 650 Port. Gravel Plant.
Pioneer Port. 11x36 Jaw, 30x20 Rolls.
Telsmith Sand-Gravel-Screening, large capacity.
Cedar Rapids 4038 hammermill, complete, excellent.
Diamond 66, Port. Prim. 1016 Secondary 3019.

CLASSIFIERS

Conveyco 6'x10' sand-dewatering pump and motor.
Dorr 5'x20' Rake type.
Dorr 6'x21' Duplex, Rake type.

CONCRETE PLANTS AND EQUIPMENT

Johnson concrete plant 348 ydc, 3 aggr. compt.
Cement silos, Corps of Engr. Spec.
Johnson concrete plant 200 ydc, Corps Engr. Spec.
6 aggr. compts, cement silo 2705 bbls.
Erie Strayer Port. Complete 30-40 yds. hr.
Johnson 200 yd. 4 aggr. compt. 200 bbl. cement compt, 1032 bbl. silo.
B-K 400 bbl. cement bin, 400 bbl. silo.
Rotitel 160 ton 3 compartment aggr. bin.
Butler 212 cu. yd. 6 compts. Complete.
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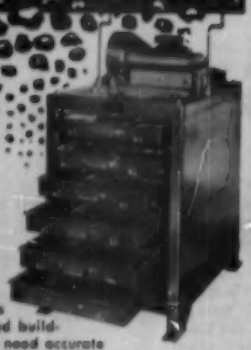

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